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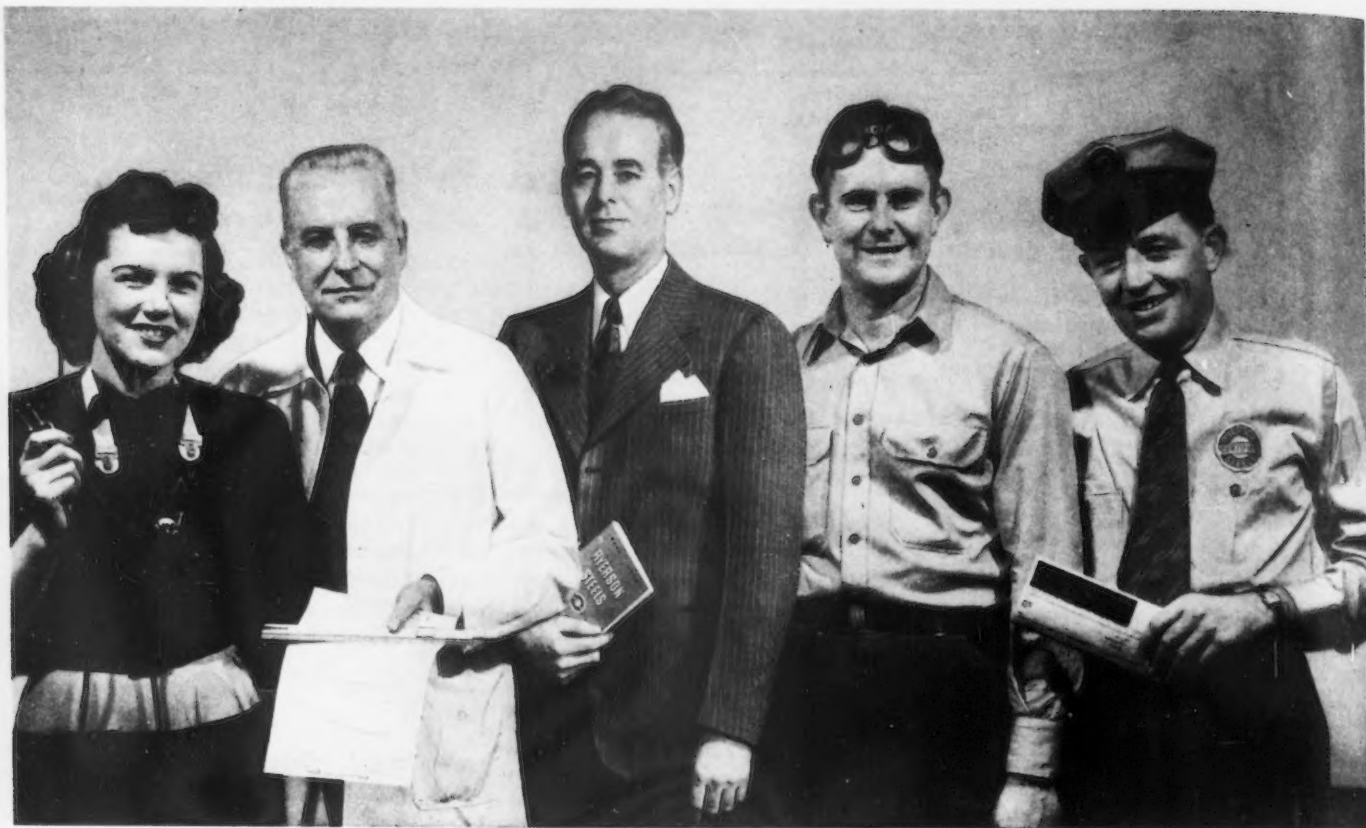
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The Real Thing

SPEAKING before a joint session of the House and Senate on March 17th, the President officially and bluntly recognized the gravity of the Russian menace to western civilization. The cynics may note that this is an election year, that the crisis technique had been used effectively by his predecessor to secure added power and continued tenure. They may conclude that this was merely a flamboyant move in the game of domestic politics. Such a conclusion gravely misapprehends the problem.

If the President is at all conscious of the implications which his summons to Congress contained, he must realize that his appeal, although a tribute to his courage, may also accentuate his political vulnerability. There has been more than a suspicion that the White House, up to this point, had been playing for the support of a disturbingly large group of "liberals" who followed Wallace. The appeal for greater military power, for the avowed purpose of checking the Communists, may in fact forfeit whatever hope Truman had of weaning Russophiles away from Henry.

The admission that raw military power in being, instead of a more remote potential, can be the only possible check upon a dangerous aggressor is at the same time a confession that American diplomacy since the end of the war has rested on fallacious premises; that its results to date have been completely disappointing. A private individual can admit mistakes without losing stature. A politician cannot admit past error or future fallibility and remain a politician.

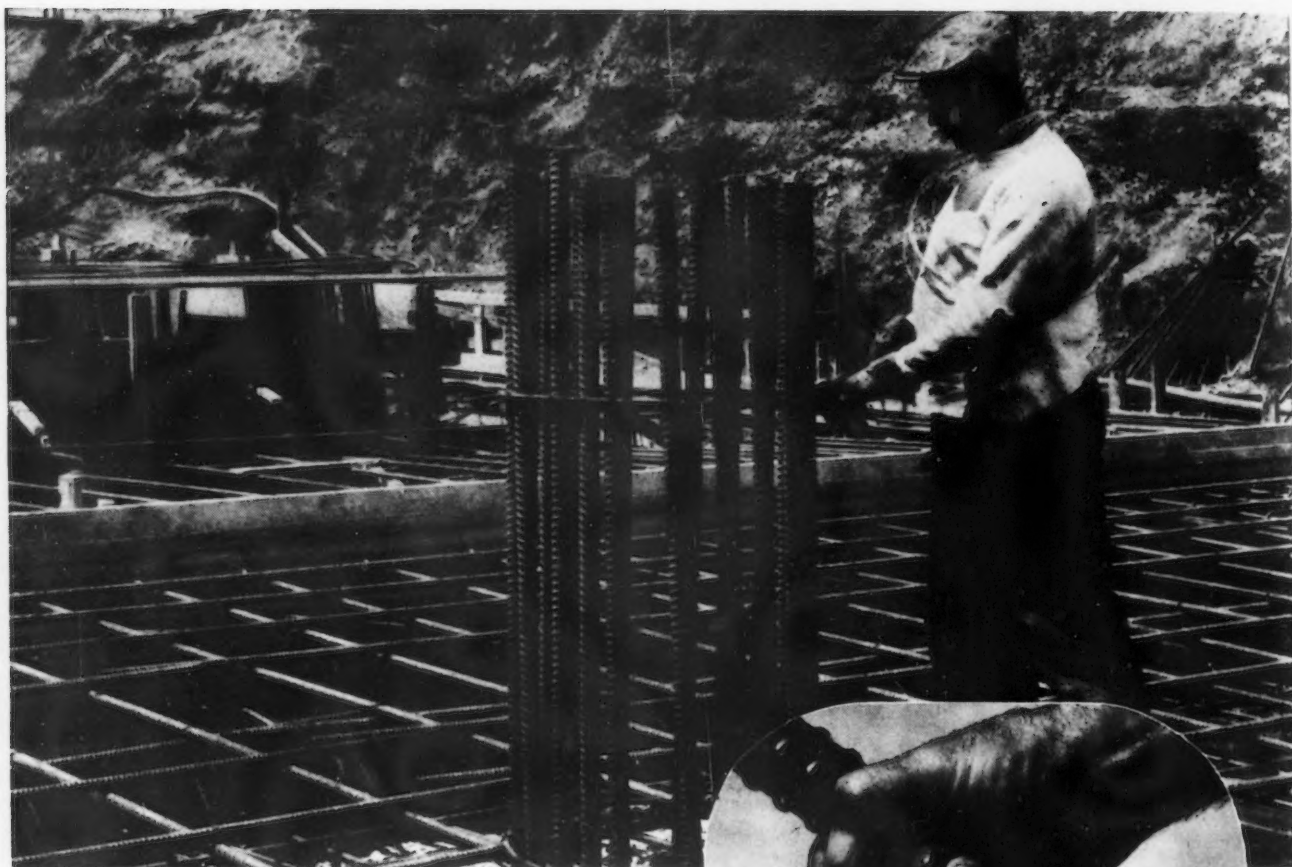
During the war our State Department accepted the professed peaceful intentions of our "ally" at face value. After victory our negotiators repeatedly went the second mile in conciliating a truculent and suspicious partner. As events increasingly confirmed the predatory and imperialistic character of this "strange ally," we developed a policy of piecemeal checkmating to thwart him. This Fabian tactic seemed justified by the apparent reliance of the Communists upon propaganda, penetration and perfidy as instruments of slow aggression. This reliance was supported by their faith in the "inevitable depression" which would sink capitalism. Communist ideology does not demand military action on a national scale, although it obviously is not averse to internally-fomented violence to unseat established governments. The Marshall Plan was designed to build up resistance in western Europe which might in turn redress the balance of power destroyed by our own victory.

Our alarmed leaders now realize that these measures are inadequate. This new aggressor on the prowl knows that we threw our military aces away the moment the Germans and Japs laid down their arms. He knows that foreign policy in a democracy is a slow, unwieldy evolution of compromises; that resolute decision and prompt action are rarely possible; that minorities can always be perverted to serve the purpose of an alien interest; that propaganda can confuse the thinking and corrupt the patriotism of a victim.

To anyone who has taken the pains to read even a fraction of the voluminous literature on the subject, the aim of Russian policy is as unmistakable as the contempt of the Politburo for the soft-headed idealism of western intellectuals. This is an authentic crisis. We will be well advised to look to our powder.

Joseph Stagg Lawrence

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Inland Hi-Bond reinforcing bars give added strength to modern concrete structures. (Right) Note the deep, reversed, double-helical ribs of this superior bar.



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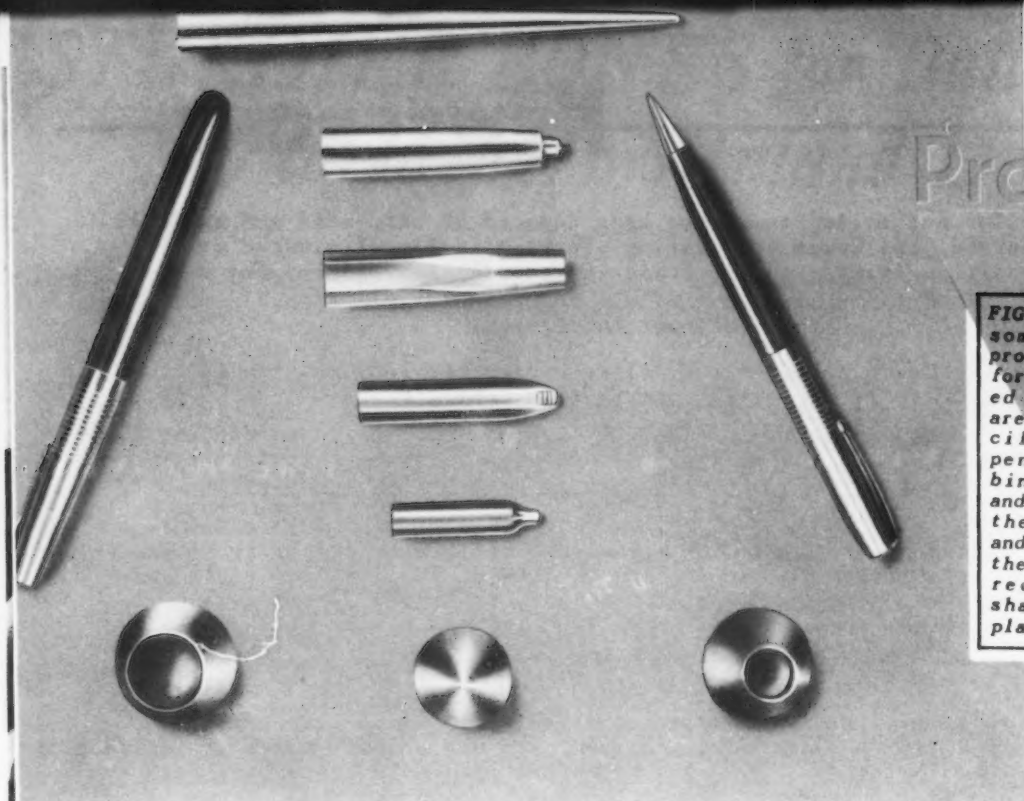
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- Pickling time for hot rolled steel has been reduced 30 pct, acid and neutralizer have been conserved, and fumes and gassing are practically eliminated at a southern mill by addition of a synthetic detergent to pickling baths. The detergent has a wetting action which reduces drag out and improves pickling efficiency, and foam on the bath surface blankets gassing and fuming.
- To bolster its dwindling proved crude oil reserves, the oil industry is planning to drill 36,000 wells this year, an all-time record number.
- Stainless steel ingot production of 540,000 tons during 1947 was disappointing to alloy producers who had anticipated a 600,000 ton year. Those studying the problem have concluded that current stainless prices have set up some buyer resistance.
- Makers of aircraft and aircraft parts are having difficulty procuring vital parts for their increased production schedules. Makers of forgings and castings are apparently not interested in the small-lot quantities needed by these manufacturers. With no priorities, the aircraft producers find that deliveries of their needed parts and materials are not competitive with other industries' large-volume orders.
- A high-strength, chrome-base refractory concrete which is able to withstand temperatures as high as 3100°F has been developed. The new product makes available a concrete combining the refractory and slag-resisting properties of chrome-base materials with the ability to support loads at high temperatures.
- Lack of coal now means lack of steel for pipelines this year and that means less gas next winter. All of this points to emergencies again in the 1948-49 winter.
- Push-button production has been achieved in England where radios are being turned out at the rate of three per min without being touched by human hands. Included in the 70 ft assembly unit are more than 20 electronic "brains" to control the operation. These controls keep the sets moving along the conveyor, stop conveyor in event of breakdown and point out where the line is broken down.
- Recent revisions in power plants of the B-36 have meant over 25,000 engineering changes. Propellers will be moved from trailing to leading edge of the wing, but the six 28-cylinder Pratt and Whitney engines will be left in their present position.
- Crystal gazers who had called for a down-turn in steel demand within the next few months have had to draw in their horns. All at once the air is full of reports that defense programs will take more steel and more of everything. Before these reports there was nothing in the picture to indicate any significant decrease in steel requirements.
- Reconsideration of the whole question of further dismantling of German heavy-industry plants is in the cards for the near future. The senior administrator of the British zone in Germany has recently visited London to recommend radical changes in British policy toward Germany.
- Modern steel arithmetic occasionally reads like magic, mostly because of the gray market situation. A midwestern firm, for example, recently found that by increasing the length of its sheets 6 in., the larger pieces of scrap available could be sold in the gray market for enough to repay the additional mill price of the prime sheets.
- In its new mill, Tube Making Machines Ltd., Birmingham, will produce tubing from steel strip at 100 fpm (12 fpm by drawing and annealing method). In the new mill it is claimed that dirty, hot and energy-dissipating processes will be avoided.
- Impetus in industrial markets because of defense talk has not even taken into account the Marshall Plan needs. The full impact of these will come later. ERP is really a defense program for Western Europe. Superimposing all this on top of a high domestic demand spells plenty of activity for some time to come---and probably more inflation.
- Argentina has placed an order for 1000 tons of tool steels on one steel producer. This indicates how flexible exchange restrictions can be made to cover strategic materials or equipment.



Production

FIG. 1- Illustrating some of the parts produced by electroforming over hardened steel mandrels are the pen and pencil caps, the desk pen cap, the combination hexagonal and round piece, and the two crucibles and cone shown. All the pieces were directly formed to shape in a single plating operation.

ELECTROFORMING has simplified many design problems in the past, primarily in small lot, precision jobs. Only recently have improved techniques permitted its use on a mass production scale to allow freer design and cheaper production of many articles. Camin Laboratories, Inc., New York, is currently electroforming more than 40,000 small articles a week at a cost said to permit competition with all but the simplest standard forming operations. Some typical electroformed parts produced by Camin are shown in fig. 1.

Electroforming, as shown in fig. 2, involves the electrodeposition of a relatively thick layer of metal on a mold or matrix and subsequent removal of the shell from the mold so that a self-supporting part or formed article and not a mere coating is produced. The process has been fairly widely used for some time in the manufacture of dies for molding plastics, in making phonograph record masters and stamping plates, electrotypes, pitot tubes, radar wave guides, venturi nozzles, and in similar applications where precision forming of the article has been essential.

These uses, however, have been for the production of a comparatively limited number of pieces in which close tolerances or difficult shapes were required, and it is only recently that adaptation and improvement of techniques have brought the process into production usage to the extent that Camin Laboratories reports its method capable of producing articles of certain designs, especially tubular, conical and cup-like shapes, more

economically than by deep drawing or by other operations involving more than a simple swedging or stamping. Secondary operations such as punchings, millings and annealings are avoided, as the piece is formed directly to the desired shape.

Copper, silver, iron and other metals can be and are electroformed, but nickel because of its hardness, tarnish resistance and comparatively rapid plating rate has been the standby in production work. Using a Watts bath at 150°F with modified operation techniques, and current densities between 200 and 250 amp per sq ft, Camin plates nickel at a rate of 0.010 in. per hr, and it is this speed which enables the method to be commercially competitive. Actually at least double this plating rate is possible and is used when forming molds or pieces in which only internal surfaces next to the mandrel are critical. However, with economically feasible bath agitation, general forming at more than 0.010 in. per hr is unsuccessful as the external surfaces tend to develop ripples and irregularities.

The process, as employed by Camin, involves fixing the mandrels on which the articles are deposited to an endless moving conveyor which spins and plunges them as it moves through the 38-ft bath length. The conveyor speed is controlled so as to determine the plating time and thereby the thickness of the piece. Automatic control devices continually circulate and filter the plating solution and assure proper bath temperature and current density.

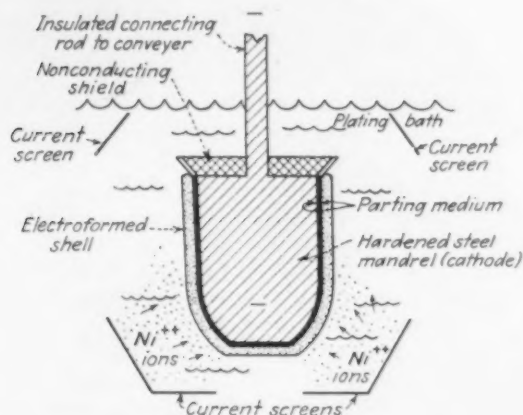
Electroforming

By THOMAS S. BLAIR

Associate Editor
THE IRON AGE

The present Camin tank and conveyor, shown in fig. 3, is geared to small article production as it was specifically designed for the forming of fountain pen caps, such as those seen in fig. 1. However, a new, more flexible setup which will more than double present capacity has been designed and is expected to be in operation by summer.

Although electroforming can compete favorably with a simple drawing operation, the really substantial savings arise in the realm of high design or special shaping where irregular patterns ordinarily requiring a series of forming steps are just as simple to make in the original electroforming operation as a perfectly plain shape. Pieces which perhaps involve a combination of hexagons and rounds are as straight forward as the making of plain tubing. An example of the intricate shaping possible is the silver table lighter shown in fig. 4.



ABOVE

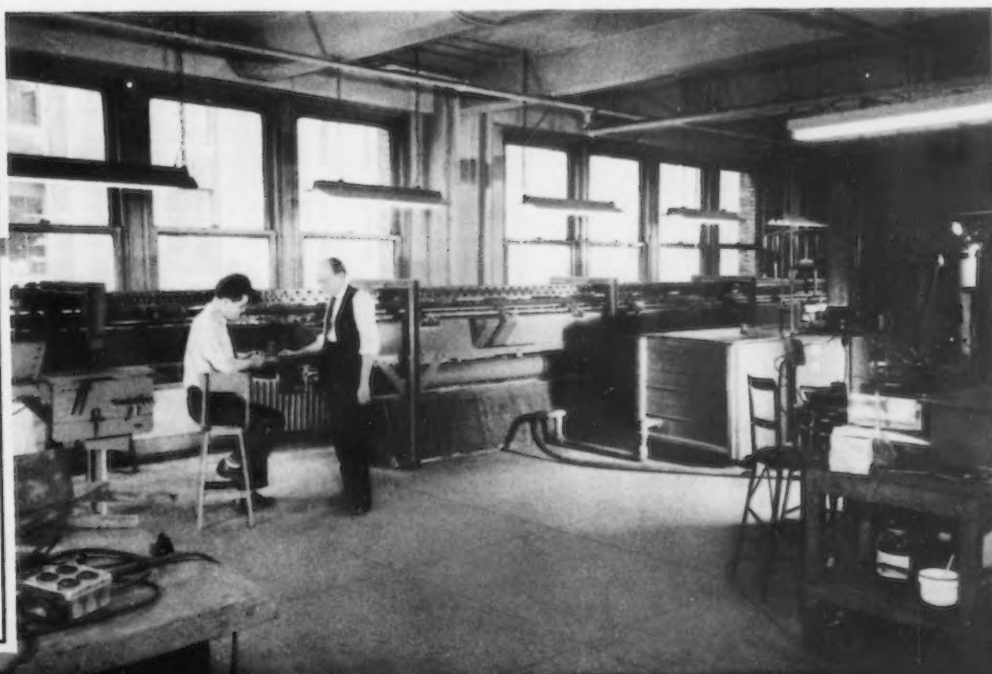
Fig. 2 - Sketch indicates the general method for electroforming a crucible shape. A relatively thick layer of nickel is electroplated at a rate of 0.010 in. per hr from a Watts bath onto a hardened steel mandrel.

RIGHT

Fig. 3 - Oval-shaped plating tank used for mass production of 40,000 small parts per week by electroforming is shown. A single operator can handle the tank during normal operation, removing the formed shells and preparing the mandrels on the endless conveyor for re-entry into the 38-ft long plating channel.

Adaptations and improvements of plating techniques have advanced electroforming to the point where it can compete with standard forming operations as a production process, being found especially efficient for tubular, conical and cup-like shapes. This article describes an installation which is electroforming over 40,000 small articles a week, with precision of the pieces and ability of the process to form intricate shapes or articles of high design proving to be the outstanding advantages. Electrodeposition on plastics and electropolishing operations are also touched upon.

For the comparatively simple shapes, such as fountain pen caps, in which no undercuts are involved and the mandrel can pull out of the plated form, Camin generally plates onto a hardened alloy steel mandrel to which a thin layer of a parting medium has been applied. Parting mediums, such as carbon black, beeswax, collodion, turpentine, potassium dichromate and solutions of selenium or arsenic salts, allow plating over the mandrel but prevent a strong bond from forming between the mandrel and the plated metal, so that after completion of the plating operation friction applied to the spinning



mandrel on the conveyor frees the plated shape. A single operator can handle the tank during normal operation, removing the formed shells and preparing the mandrels on the moving conveyor for re-entry into the plating channel.

There are other means for subsequent freeing of the shell. The mandrel can be evenly coated with tin either by a plating operation or by a dip and wipe. Then immersion of the mandrel with its plated shell in a hot oil bath will melt the tin and separate the two pieces.

Still a third alternative is to choose a mandrel of Kovar or glass or some material having a correspondingly low coefficient of expansion. On heating, the comparatively greater expansion of the shell will part the pieces.

In forming housings, wave guides or complicated parts that involve undercuts, fusible mandrels made of a bismuth-lead eutectic alloy, such as Cerrobend or Cerrobaze are used. These mandrels are centrifugally cast in the desired shape, the part is formed around it and the mandrels, which melt at temperatures from 158° to 281°F depending upon the alloy used, are melted out in a hot oil bath. For production work a 600°F bath, using Socony-Vacuum Hecla mineral oil, is said to be very satisfactory as it is hot enough to melt out the mandrel in from 30 sec to 1 min depending on the shape involved. The alloy is recovered and recast for another part to be formed around it. This can be continued indefinitely although a loss of a small percentage of the mandrel must be expected with each cycle. Such work involving additional mandrel forming operations becomes comparatively costly, but the parts so produced would otherwise have involved correspondingly expensive procedures, and by electroforming a uniform one piece part is obtained where often a soldered or brazed item would otherwise be required.

Another advantage of the electroforming method is its precision. With the permanent mandrels tolerances of ± 0.0005 in. are no problem as the mandrels can be machined and ground to a very precise form to which the plating layer will absolutely conform internally. Thickness and outside tolerances of the part are controlled by adjustment of the plating bath characteristics. Tolerances of ± 0.001 in. on external dimensions are easily held in production.

Tight tolerances are also possible with the fusible mandrels if sufficient care is taken in casting and finishing them. But generally in production work high precision is not essential and, since the mandrel must be cast and ground for each piece and cannot be used repeatedly, tolerances of the order of ± 0.002 in. are generally maintained since greater precision would involve excessive time and expense.

The mandrel is reproduced with exceptional faithfulness and precision. Engravers' marks, perhaps 0.00002 in. wide, and the minute sound groove configurations of phonograph record masters are exactly duplicated. This characteristic of the process is not entirely a blessing, however, as any imperfections or scratches are not plated over but are faithfully reflected in the formed part. Mandrels can be easily inspected, so this drawback is little trouble in production



FIG. 4 - Silver table lighter formed over a fusible mandrel illustrates the intricate and precise shaping possible by electroforming.

work where a permanent mandrel is examined once and then used over and over again.

Thin wall and capillary tubing are easily and accurately formed. Nickel tubing with a 0.005-in. wall becomes quite expensive when formed by standard drawing and annealing operations, but by electroforming it can be formed relatively cheaply and with high precision. Capillary with a 0.002 or even 0.001-in. wall thickness is easily produced over a wire mandrel.

Another advantage of electroformed work, particularly valuable in molds, tubing and capillary, is the high internal polish of the pieces, requiring no subsequent finishing operations. The mandrel surface must be scrupulously clean and polished and this reflects in the formed piece when it is removed from the mandrel. In small tubing to be used for sleeve-type bearing applications, such as in the second hand workings of a watch or clock, this internal polish is very desirable.

Electrodeposited nickel, as shown in the micrograph in fig. 5, is quite fine grained, metallurgically sound, strain free and is said to be stronger and harder than nickel which has been cold worked and annealed. An independent laboratory tested four different pieces formed by Camin and found an average tensile strength of 87,200 psi and an average hardness of 92 Rb, which is a moderate hardness slightly greater than that generally obtained with a Watts-type bath and standard techniques. As a test of ductility, especially valuable where subsequent forming or shaping of a piece is desirable, a 0.009-in. sheet of deposited nickel was bent 180° on itself without rupture.

Electrodeposition on plastics is another operation being done at the Camin plant on a production basis. Phenolics, polystyrene, ureas and other thermosetting, thermoplastic and non-plasticized types which are permanent at 150°F can be readily metallized. The plastic articles are roughened and sensitized and a very thin pure silver film is imparted to the piece by chemical reduction. It is in this step that greasy or heavily plasticized materials prove unsatisfactory as they will not take the silver film. Nickel is then electroformed on the silver to the desired thickness and a secondary finish of chrome, gold or any desired metal can be flashed on top of the nickel.

Plumbing fixtures, cigarette holders and razor handles, shown in fig. 6, have been among the plastic base articles formed by this method. A 0.005-in. nickel plate was applied to the plastic razor handles at a 12¢ per piece cost to give an article which weighed 42 g in comparison to 80 g for an aluminum cast, identically shaped handle. Similarly a zinc diecast plumbing fixture knob weighed 2½ oz compared to 7½ oz for the same plastic piece metallized with 0.0075 in. of nickel.

Both of these were subsequently chrome plated and the overall cost analyses showed the plastic base piece to be 30 pct cheaper. Shipping charge savings due to lightness of the fixtures further increased the cost differential.

Metallization of plastic bases appeals to designers, as delicate and unusual shapes for high design which are given to metal only with difficulty and at great cost can be easily molded in plastic, and the process, while offering the advantages of lightness, allows application of as much metal as strength and wear requirements demand.

Camin is in the process of developing an electropolishing operation to supplement their work, as polishing of the external plated surface of an electroformed piece remains a major operation. Their process, involving a selective removal or deplating of metal, is applicable to all plated metals and in many cases takes less surface material from a piece than a buffing procedure.

Sufficient data are not yet available to allow complete evaluation of the electrofinishing, but some rather remarkable effects have been observed. Fish hooks, razor blades and similar articles were apparently rendered sharper by the process and micrographs taken before and after polishing have in fact shown the point or cutting edge to be improved.

Springs polished by the electrofinishing method have shown prolonged life and better performance. The reason for this is not completely understood, but the operation apparently removes or reduces surface occlusions and other friction producing surface elements.

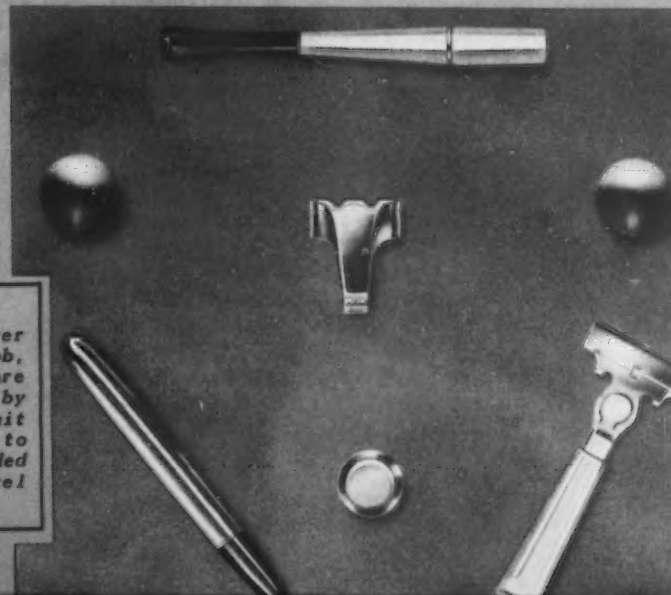
Electropolishing of plated nickel also eliminates the danger of softening hard nickel, as friction in mechanical buffing can often heat a piece to a temperature, around 500°F, sufficient to cause the nickel to lose its hardness.

It has also been observed at Camin that an electrofinished article does not tarnish or rust as quickly as an identical buffed piece, presumably because of surface equipotentialization and passivation, although no real exposure tests have been conducted as yet to establish this.



ABOVE

FIG. 5 - Micrograph, 500X, taken parallel to outside surface, shows the grain structure and uniformity of the electrodeposited nickel. Etching was by a mixture of nitric and acetic acids.



RIGHT

FIG. 6 - Cigarette holder, electric shaver part, two perfume bottle caps, a radio knob, a mechanical pencil and a razor handle are shown as examples of the articles formed by metallization of plastic bases. To permit high design, which would be too expensive to apply directly to metal, plastics are molded to shape and metallized with as much nickel as strength and wear requirements demand.

Fractography

THE STUDY OF FRACTURES

AT HIGH MAGNIFICATION

Having established itself as a successful analytical instrument in the hands of the research metallurgist, fractography now shows similar promise as a commercial tool. Summarizing the principal features of this interesting technique, the authors indicate the application of fractography to the study of various ferrous and nonferrous metals, including zinc, bismuth, iron-silicon alloys, iron-chromium alloys and molybdenum. Of particular interest is the association of certain features, visible in the fractographs, with physical property characteristics of the metals involved.

BY C. A. ZAPFFE

F. K. LANDGRAF, JR., and C. O. WORDEN, JR.

Baltimore

SHORTLY before the war, research conducted at Battelle Memorial Institute by the senior author led to the successful development of a microscope technique enabling the viewing of fracture facets at high magnification¹. The surprising amount of information found on the facets, and the marked sensitivity of the cleavage pattern to constitutional effects, warranted further investigation of the technique as a standard metallographic method.

Fractography is the name now given to this technique². It has been applied to the study of several metallurgical systems³⁻⁷ and to elaboration of certain phenomena within the systems^{8, 9, 10}, though necessarily in a preliminary manner because of the abundance and the complexity of formations observed, most of which are new to the science.

For the past year a consistent and continuous investigation of the method has been enabled

For further information on the use of fractography in the study of molybdenum, see "Deoxidation Control by Fractography," THE IRON AGE, Dec. 4, 1947, p. 78.

through sponsorship by the Office of Naval Research; and the present paper briefly summarizes certain principal features found in the studies to date. Its purpose is to provide the reader with a rapid means for evaluating the technique, its results and its possible applications to problems and studies not yet undertaken.

The microscope technique is a relatively simple operation. Briefly, a specimen is fractured by any means, but preferably in a manner which disfavors slip and ductile flow, and therefore favors the development of expansive cleavage facets traversing most or all of each grain. Any fracture can

be examined, but those with larger facets are obviously more suited.

For mounting the specimen, any inverted orienting device can be used in preliminary studies. Bausch & Lomb Optical Co., however, has under development a specially-designed "fractographic stage" which greatly simplifies all operations.

With any given type of holder, the specimen is fastened so that the fracture face is approximately perpendicular to the microscope illumination. A lens combination giving a magnification of not less than 100 is then used to obtain only an approximate focus. A given facet is selected merely by traveling across the fracture face at this approximate focus and by tilting the specimen through low angles until a flash of light automatically signals that an individual facet is perpendicular to the objective beam and ready for examination.

For this examination, any lens system can be used up through oil immersion, and the higher the magnification the better.

The outstanding feature of fractography is the surprising fact that facets which defeat observation at 50X are readily studied at 500X.

In some cases, an especially desirable facet lies in a deep recess on the fracture. Here a small electric hand grinder serves well for removing surrounding promontories. However, one should bear in mind that a facet in deep recess on one half of a fracture correspondingly has a mirror twin exposed in great prominence on the other half. In fact, promontories in general are helpful, rather than interfering, for they themselves are capped with cleavage facets often containing valuable information. The general practice thus remains merely to bring the lens sufficiently near to

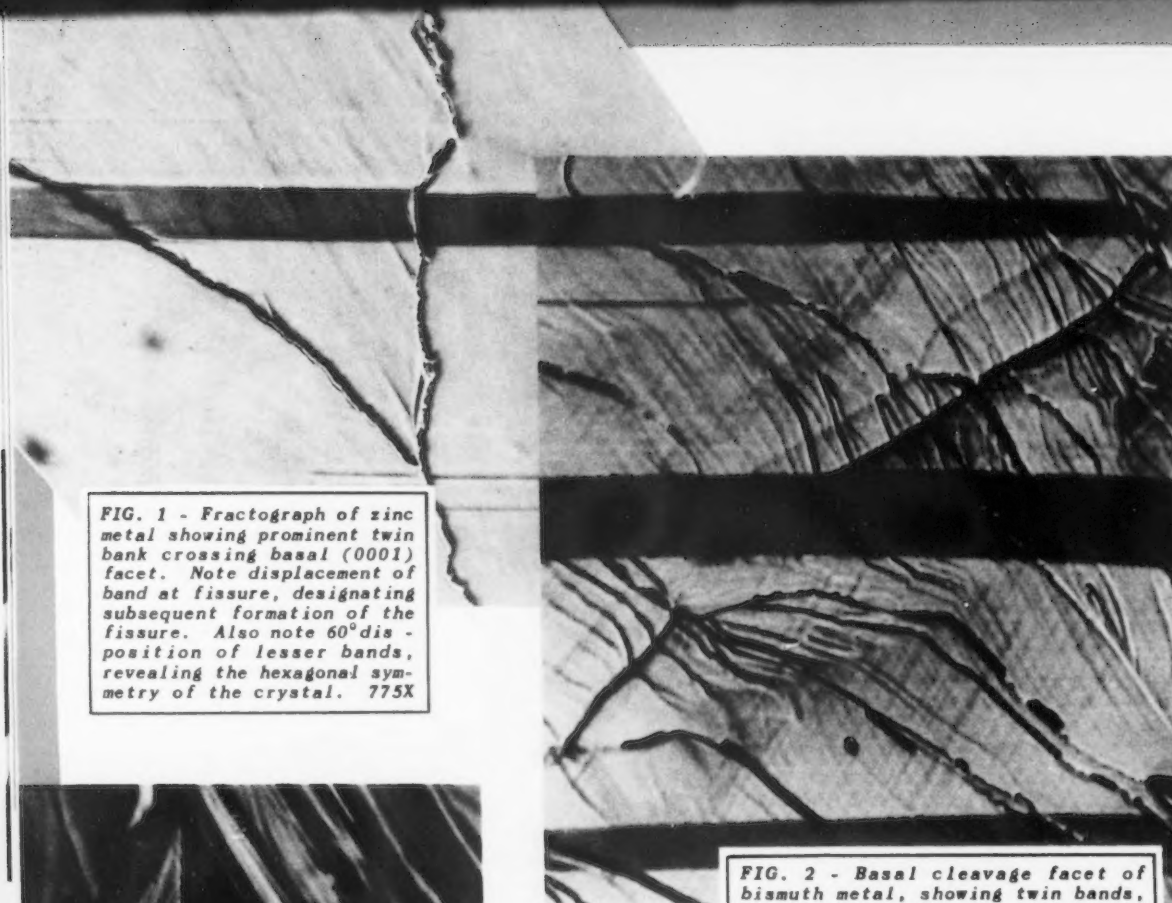


FIG. 1 - Fractograph of zinc metal showing prominent twin bands crossing basal (0001) facet. Note displacement of band at fissure, designating subsequent formation of the fissure. Also note 60° disposition of lesser bands, revealing the hexagonal symmetry of the crystal. 775X



FIG. 2 - Basal cleavage facet of bismuth metal, showing twin bands, fissures, miscellaneous evidences of crystal imperfection, and a remarkably uniform overlayer of fine "striae" believed to represent a phenomenon developing at the instant of production of the new surface. 450X



FIG. 3 - Fractograph showing secondary cleavage in bismuth along nonbasal planes. Note the central spine perfectly bisecting the angle of the intersecting lamellae. Sample of previous figure, melted and recast. 1400X

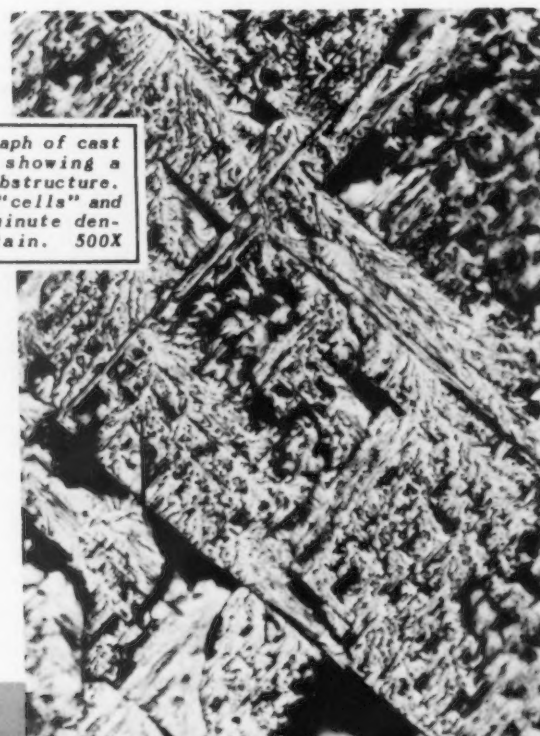


FIG. 4 - Fractograph of cast 4.24 pct Si-Fe showing a highly complex substructure. Note rectangular "cells" and the myriads of minute dendrites they contain. 500X

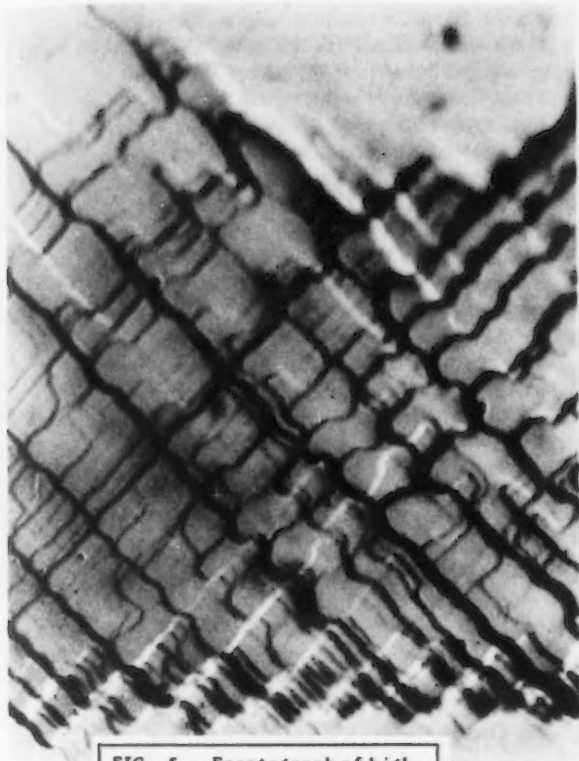


FIG. 5 - Fractograph of highly distinctive "terrace pattern" of zeta phase (FeSi_2) in commercial 50 pct ferro-silicon. 2000X

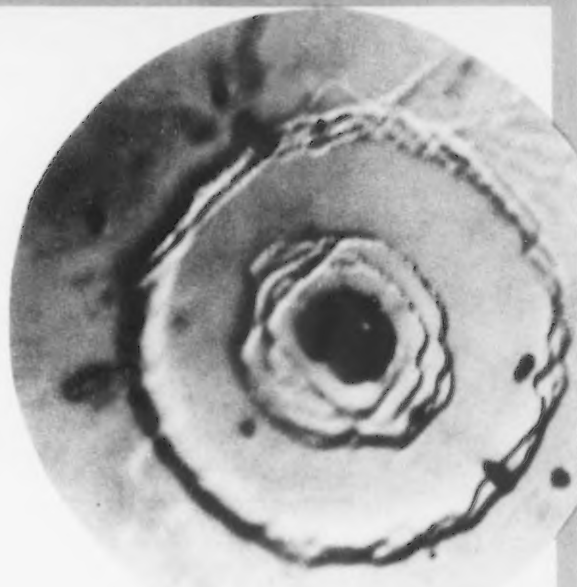


FIG. 6 - "Bull's eye" pattern on cleavage facet of zeta-phase ferro-silicon. This structure is believed to result from a formation of silicon monoxide, SiO , in the liquid state with subsequent decomposition to produce SiO_2 and free silicon. The effusion of free Si from the inclusion causes a symmetrical change in fracture pattern. 2000X

FIG. 7 - Fractograph of cleavage on a cube face (001) of 4.24 pct Si-Fe showing a "V" formation of Neumann bands, some intersecting cleavage markings on other cube faces, and further markings perhaps ascribable to slip on $\{110\}$. 300X

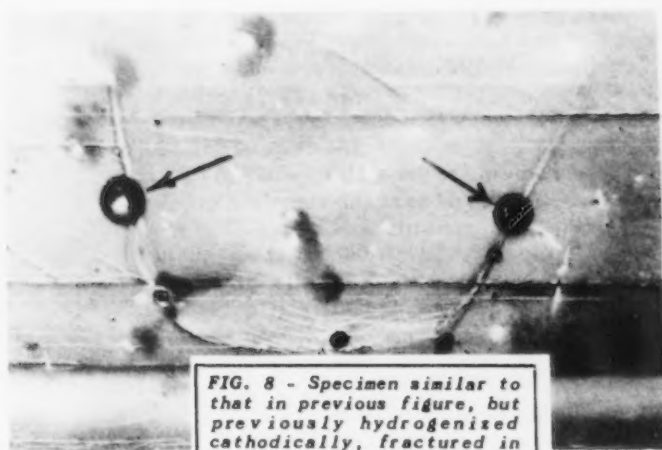


FIG. 8 - Specimen similar to that in previous figure, but previously hydrogenized cathodically, fractured in impact, and immediately coated with oil. At least two bubbles can be seen trapped in the oil film immediately overlying Neumann band traces. 200X

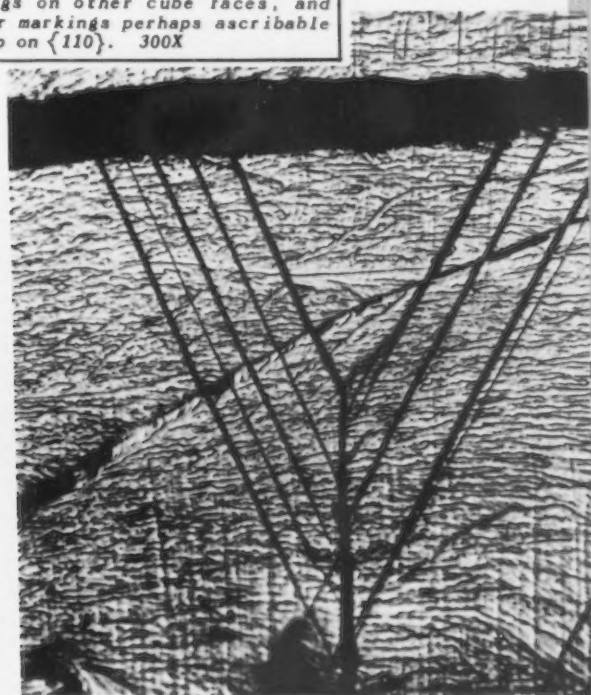




FIG. 9 - Fractograph of 7.70 pct Cr-Fe air-cooled from 875°C (1607°F) and fractured in impact. "Oak-leaf" pattern and extremely minute facets are characteristics of this tough, strong metal. 2000X

the sample to provide some facets in focus, regardless of which they are.

Only one suggestion of major importance remains; that is to use oblique light. Oblique illumination does for these unpolished and unetched, but slightly irregular surfaces, what etching does for conventionally prepared samples. Slight shadow throws into relief those variations which constitute the cleavage patterns here termed *fractographs*.

APPLICATION OF FRACTOGRAPHY

Zinc — Zinc is a metal that can be readily cleaved. The specimen is "C.P. Zinc Metal," having arsenic, antimony and iron as its principal impurities, totaling less than 0.01 pct. The as-cast metal, squeezed in a vise or struck with a hammer, readily fails by cleavage principally on basal (0001)

FIG. 10 - Fractograph of 17.16 pct Cr-Fe air-cooled from 875°C (1607°F) and fractured in impact. Note comparison with previous figure. Facet has lost much of its roughness, has greatly increased in size, and has begun to indicate angularity. 750X



planes in its "close-packed hexagonal" crystallographic system. Fig. 1 shows at a magnification of 775X such a cleavage facet with a strongly-marked twin band traversing the field. Since these facets are nascent and untouched, all markings become significant as intrinsic features of the crystal. Displacement of the twin band by the fissure indicates that the twin formed previous to the fissure. Lesser markings at sharply crystallographic angles are also twins; and the 60° disposition of one set reveals the hexagonal symmetry of the crystal. Because the facet in a fractograph is a facet of the crystal system, all angular markings directly reveal the crystallographic relationships; and these twins are found to be $\{10\bar{1}2\}$. As proved by the continuous traverse of the twin bands across the field, material within a single grain is being examined, the grain boundary lying outside the field of the fractograph.

Bismuth — A metal somewhat similar to zinc in crystallography^{4,5}, bismuth (rhombohedral) similarly cleaves readily on a basal plane (0001); and twins abound. In fig. 2 a cleavage facet of 99.5 pct "C.P. Bismuth Metal" reveals twin bands and fissures. In addition, there is a uniformly overlying network of thin "striae" disposed exactly at 60° to one another. These, it is believed⁴, form at the instant of cleavage separation from the "freezing" of a minute surface film, which possibly experiences a condition not unlike liquefaction at the moment the new surface forms. Other markings can also be detected in the figure, representing crystal imperfections.

Although these metals readily cleave along the basal plane, conditions of rapid fracture at an angle to that plane can force cleavage along secondary planes. Fig. 3 presents such an instance. This remarkable pattern is difficult to interpret, but a major "spine" can be seen perfectly bisecting the angle of the multilayer platelets which it intersects. Such a fractograph may be particularly valuable in disclosing the substructure of the crystal, for these patterns are clearly not patterns of imposed stress, but of crystal substructure.

Iron-Silicon alloys — Workers with electrical sheet know that great differences in properties exist between iron containing 2 pct and iron containing 4 pct Si. Conventional metallography, however, discloses no changes until over 14 pct Si is added.

Fractographically, great differences are readily observed³. An instance of the elaborate substructure within iron containing 4.24 pct Si is shown in fig. 4. Rectangular "cells" within the grain prove to contain myriads of minute fern-like dendrites — conformations obviously strongly affecting electrical properties. The specimen in the figure, of course, was cast, whereas electrical sheet is strongly worked. But the structure remains highly significant as a revelation of what it is that the working must overcome to attain useful homogeneity.

With much higher silicon contents there enter the commercially produced ferrosilicons useful in steelmaking. These range from perhaps 40 to 90 pct Si. Their cleavage patterns are so distinctive that one grade can quite readily be distinguished from another. Fig. 5 shows the elaborate "terrace structure" of the zeta phase (FeSi_2) occurring near 50 pct Si and extending for a range to either side. According to the proportion of this pattern

in a field, one can estimate composition within several percent. A common bench microscope in the foundry could serve quickly to separate ferro-silicons, should such a need arise.

Also within the zeta phase there are frequently found surprising forms having virtual circularity. An example is shown in fig. 6. Separate investigation of this phenomenon⁹ has led to the supposition that an oxide inclusion develops in this alloy, while molten, which lacks the customary oxygen for silica, SiO_2 , and can be designated instead as a monoxide, SiO . On cooling, this monoxide decomposes to form the dioxide, SiO_2 , plus free metallic silicon, which diffuses out into the surrounding metal and enriches it sufficiently in silicon to change the cleavage pattern. This decomposition action is identical with that of silicon monoxide's close analog, carbon monoxide — also to the known decomposition of FeO on cooling to form Fe_3O_4 plus free iron — and to the general chemical principle that at higher temperatures complex forms dissociate into simpler forms, and vice versa. However, such activity on the part of silicon was previously unsuspected by metallurgists.

Returning briefly to irons of lower silicon content, one finds the interesting phenomenon known as "Neumann bands" particularly prevalent. These are deformation markings analogous to the twin bands shown in the first several fractographs, but believed to be considerably more complicated on a fine scale⁸. An example in 4.24 pct Si-Fe appears in fig. 7. The "V" comprises Neumann bands registering on an (001) cube face of the crystal; and the angle of 34° delineated with respect to the cleavage intersection of the two arms of the "V" conforms to the $\{112\}$ habit of the bands. Other angular markings can perhaps be identified as $\{110\}$ slip.

When such a specimen is coated with oil, some remarkable observations can be made with regard to the distribution and behavior of gases in the metal⁸. Although photographically poor because of the difficulty in photographing through an oil film with a dry lens, fig. 8 shows a cleavage face of this same material which has two bubbles distinctly issuing from two different Neumann bands. The specimen in this case had been charged cathodically with hydrogen gas before fracturing. This gas is known to make the metal brittle; and it is believed that it does so by precipitating under great pressures within the imperfections which later seat slip and cleavage during mechanical deformation.

This theory is now demonstrated to be correct by the experiment in fig. 8, for the gas effuses only at the trace of deformation markings, here Neumann bands, at the moment of fracture and for a period thereafter. Also, the bubbles appear fully developed and with great suddenness, proving that their individual quantum of gas was derived from an occluded pocket of that gas, and not from atomic solution within the iron lattice. While the act of dissolving in the metal is known to involve individual hydrogen atoms, those atoms apparently soon escape into microscopic pockets of molecular gas distributed as a vast substructure throughout the crystal. Deformation then releases many of these trapped pockets by opening their boundaries with slip and cleavage and — most significantly with regard to the discussion already mentioned — with Neumann bands.



FIG. 11 - Fractograph of 28.67 pct Cr-Fe air-cooled from 875°C (1607°F) and fractured in impact. Compare with figs. 9 and 10 and note complete disappearance of the cleavage-resistant "oak-leaf" pattern, the great extensiveness of the facet, the marked angularity, and the wealth of substructural detail that is revealed. 750X

Iron-Chromium alloys — Since the hardening and strengthening of steel hold the greatest engineering interest, the application of fractography to any of its aspects warrants attention. Iron-Chromium alloys were given preliminary study⁶ because the system includes air-hardening steel at low chromium contents, stainless steel at higher chromium contents, and oxidation-resistant steel at still higher chromium contents. Furthermore, problems of inferior impact resistance enter with high chromium content which makes the study especially suited to fractography.

In figs. 9, 10, and 11, are three fractographs taken from a study conducted at the Rustless Iron & Steel Div. of the American Rolling Mill Co.⁶ The specimens are unworked cast metal, heat treated as indicated in the captions. Fig. 9, containing 7.70 pct Cr and 0.102 pct C, shows the typical "oak-leaf" pattern and minute facets characteristic of strong, tough metal, difficult to cleave. In fig. 10 this pattern of toughness disappears as

FIG. 12 Cast molybdenum; non-forgeable. 1200X



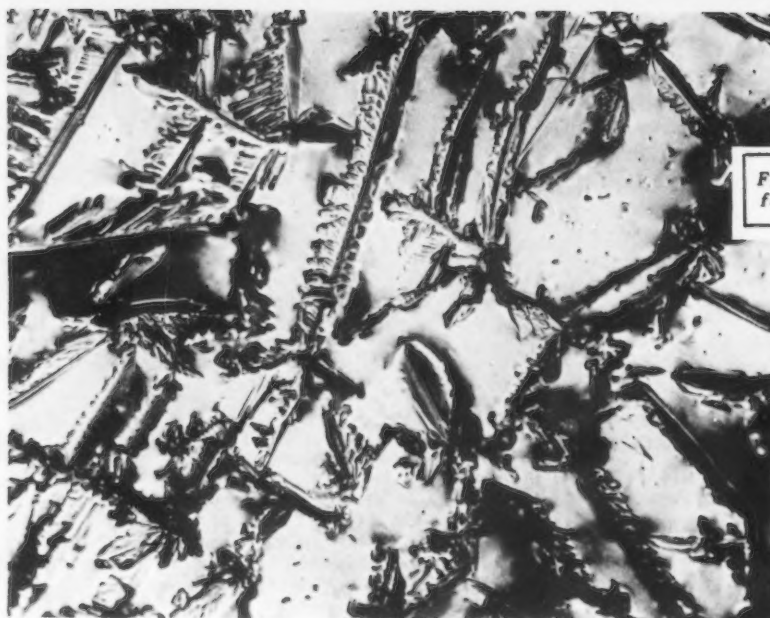


FIG. 13 - Cast molybdenum;
forgeable. 550X

the chromium is raised to 17.16 pct (0.103 C) and the martensite proportion nears zero. Notice the flattening of the facets and their increased extension, all conducive to more facile cleavage. This grade commercially has poor impact resistance. Notice a tendency for angular markings to display themselves. The black voids represent the minor proportion of tough martensite islands which pulled away during fracture.

With the chromium raised to 28.67 pct (0.107 C), as illustrated by the fractograph in fig. 11, virtually every vestige of toughness has disappeared. The facet is extremely extensive and flat, and its markings highly angular. Commercially this material, it can readily be guessed, has notoriously poor impact strength and a marked tendency for grain growth at elevated temperatures.

Molybdenum — At least one important commercial application has already developed from fractography. The Climax Molybdenum Corp.'s Research Laboratory has developed an electric-arc-vacuum process for melting molybdenum and casting that metal into ingots. It was found by Parke and Ham¹⁰ that a forgeable ingot could be readily distinguished from a nonforgeable one merely by a fractographic observation requiring but a few minutes; and this procedure now serves as a plant control.

In fig. 12 there appears the typical pattern of oxide dendrites by which molybdenum is identified as unforgeable¹¹. Such material is remelted in the Climax process.

With several points of carbon added to the metal, the oxygen content is reduced below its critical value, and the metal becomes forgeable.

The authors wish to express appreciation to G. A. Moore, A. I. Feild, M. Clogg, Jr., George Timmons and the Office of Naval Research for their assistance in making this article possible.

Its fractographic structure then changes radically to that shown in fig. 13.

To accomplish this identification, one need only

knock a tiny chip off the ingot with a hammer, stick it in the plasticine cup on the fractographic stage, and view it.

With these few exemplary illustrations, the authors have touched upon the principal studies undertaken to date. While it is still too early to warrant many conclusions to be drawn, these following points seem worthy to note:

- (1) A remarkable flatness of field and general "viewability" are provided by cleavage facets at high magnification.
- (2) Structures and patterns in great abundance register upon these facets, all significant in some respect, and many reveal information unattainable through conventional polish-etch methods.
- (3) As a scientific tool, fractography opens a field for study which is enormous.
- (4) As a commercial tool, fractography is similarly in the infancy of a promising career.

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Positive Locating

By ROBERT MAWSON,
Providence, R. I.

Drilling Jig

AN interesting jig developed for positive location of six drilled holes in the top face of a forged 14ST aluminum hydraulic jack body is detailed in the accompanying illustrations. The location of the holes, shown in fig. 1, must be positive so as to produce a final product in which the components are interchangeable. This is required so that parts ordered for repairs can be used as received at the service repair stations.

The jig design takes into consideration the necessity of reducing lost or non-productive manufacturing time. It is simple to operate, easily handled, easily constructed, and certain in its work positioning.

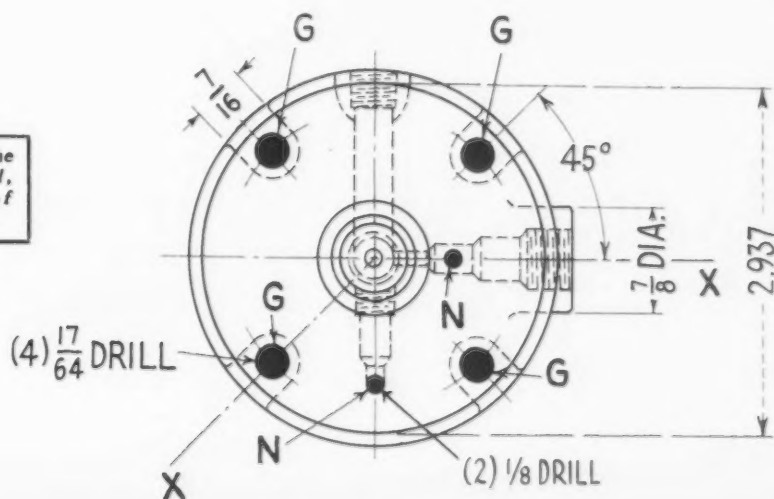
A section of the jack body, X-X fig. 1, is shown in place in the jig in fig. 4. The primary position of the part in the jig is from the circular top face of the jack body, with the $\frac{7}{8}$ in. drilled and tapped boss on the side of the part and the machined surface at the bottom providing the other positioning points.

Positive location of the part to be drilled, quick positioning and ease in handling are features of the drilling jig described in this article. While it was designed for a specific part, the idea may well be applied to other drilling operations.

The jig is primarily a box-type unit. Two cold rolled steel sections, A fig. 2, are gas welded to the top plate, B. The circular plate, C, made from pack-hardened and ground steel, is fastened to plate B with four set screws. The position of these set screws, E, is shown in fig. 3.

This circular plate is used as one of the locating mediums for the jack body, and for that purpose a projection, K in fig. 2, is accurately ground on it to fit into the 2.937-in. diam faced recess in the top of the jack body. Also, through the top plate of the jig, fig. 3, are correctly located two

FIG. 1 - Top view of the jack body to be drilled, showing position of drilled holes.



Technical drawing of the test fixture showing side and top views. The side view shows a vertical assembly with a top plate (A) having a width of $\frac{5}{8}$ inch, a central horizontal plate (B) with a width of $\frac{5}{8}$ inch, and a bottom plate (F) with a width of $\frac{5}{8}$ inch. A central vertical rod (C) passes through the plates, secured by a nut (m) and a washer (K). A hinge pin is shown on the left side. The top view shows a circular hole with a diameter of $\frac{7}{8}$ inch and a depth of $\frac{3}{16}$ inch. A $\frac{5}{16}$ -18 N.C. TAP PLATE F SCREW is shown on the right side. The overall width of the fixture is 5 inches.

Technical drawing of a mechanical part, likely a gear or flywheel, showing a top view and a side view. The top view is a square with a central circular hole. It features eight smaller circular holes arranged in a circle around the center. The holes are labeled 'E' and 'D'. The central hole is labeled 'm'. The side view shows a cylindrical shape with a central hole. Dimensions are given in inches: 2, $\frac{1}{2}$, 0.6925, 1.002, $\frac{3}{4}$, and $2\frac{1}{2}$.

[illegible]

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tool steel bushings, D, to guide the drill for drilling the two $\frac{1}{8}$ -in. holes (N of fig. 1), and four tool steel bushings, m of fig. 2, to guide the drilling of the four $\frac{17}{64}$ -in. holes (G, fig. 1). These bushings are all hardened and ground.

At the bottom of the jig, a cold rolled steel plate, F in fig. 2, is machined to slide into the cut-away portions of the side members, A. This detail hinges on a pin in the left side member and is held to its locating position by a thumb screw in the right side member.

A machined steel disk, I, fig. 2, is mounted on the end of a set screw which is placed through the tapped hole in the center of plate F. This permits the disk to be screwed up tight against the bottom of the jack body. Across the side members of the jig is acetylene welded a cold rolled steel bar, H in fig. 4. Passing through this bar to the inside of the jig body is a steel pin, J, the end of which has been machined to a good sliding fit in

the $\frac{1}{4}$ in. machined hole of the jack body to be drilled.

To use the jig, the operator swings back the bottom plate and places the jack body into the jig, wide end down, locating the top face on the disk projection and locating the side boss at the pin, J. The bottom plate is swung into position and fastened with the thumb screw. The screw fastened to the disk I that passes through the bottom plate is tightened until the disk comes into contact with the end of the jack body. This positioning is shown in fig. 4. Tightening this screw moves the jack body back onto the locating register disk at the top of the jig, Pin J, on the side of the jig, can be moved vertically about $\frac{3}{16}$ in., as shown in fig. 2, to enable disk K to be the positive locating medium.

The two $\frac{1}{8}$ -in. and four $\frac{17}{64}$ -in. diam holes are then drilled in the face of the jack body, the drills being guided by the bushings D and m, fig. 3. This gives a positive duplication of hole centers.

Exposure Tests On Protective Coatings for Steel

EXPOSURE tests of nonmetallic protective coatings for structural steel indicate among other things that lanolin base priming paints while not as effective as standard red lead in linseed oil give relatively good protection considering comparative weights, according to an interim report by J. C. Hudson and T. A. Banfield published in the *Journal of the British Iron & Steel Institute* for January, 1948.

In the tests, being carried out as part of the investigations conducted by the Protective Coatings Subcommittee of the British Iron & Steel Research Assn., sprayed coatings, various painting schemes and other protective finishes were applied to mild steel flats and these were then periodically examined over the course of atmospheric exposure or immersion in seawater.

Two coat paint finishes, applied to steel which had been pickled in a sulfuric-phosphoric acid mixture with a final dip in 2 pct phosphoric acid, were still in good condition after 5 yr in the atmosphere. But application of the identical coating to specimens prepared by weathering and wirebrushing were said to result in failure, the point where more than 5 pct of the surface area becomes rusted, after $1\frac{1}{2}$ yr. Treatment of this type surface with commercial inhibitive washes, containing phosphoric and chromic acids, prior to painting reportedly failed to improve the coating efficiency.

Lanolin based priming paints hardened with synthetic resin were experimented with and were compared to a standard primer of red lead in linseed oil. Two coats of each primer were brush applied and covered with two coats of finishing paint. One of the lanolin base paints was pigmented with zinc chromate, red oxide and kaolin, the other with zinc chromate, zinc oxide, lead chromate and kaolin. These lanolin

base coatings showed failure after an average of 4.4 yr exposure while the red lead coatings were still short of failure after 4.8 yr, the last time of inspection. Also, rusting apparently spread more rapidly on the samples having a lanolin base primer once it got a foothold.

On the whole, however, the committee regards the results obtained with the lanolin paints as good, particularly in view of the comparative weights of the red lead and lanolin primers.

A process in which a hot paint having a stand oil and wax medium and no volatile constituent is applied by spray gun was said to provide good protection. For this work the pigment used consisted of a mixture of white lead, zinc oxide, and aluminum powder tinted with carbon black.

Spray application of a wet slurry of cement and asbestos to specimens has also given good results judging from external appearances after 5 yr. For adhesion of this coating a tack coat of bituminous emulsion was applied between the steel and the cement-asbestos.

A coating made from a gallon of tar with 1 lb each of tallow and slaked lime added and brush applied at about 390°F to samples carrying practically unruled millscale failed within 3 yr, a life comparable to that which would have been expected with a single paint coat of approximately the same weight.

Specimens coated with a $\frac{1}{16}$ -in. sheathing prepared from raw rubber, waxes and resins were still intact after 5 yr in the atmosphere, with slight cracks and color change in the coating the only visible effects, but did not fare so well in marine exposure.

Vitreous enamel coatings were still in perfect condition, except for minor mechanical damage, after 5 yr in both industrial and nonindustrial atmospheres and after 2 yr in seawater.



FIG. 1 - Part of the shop area made available for steel fabricating operations by construction of 14-ft lean-to running 240 ft along south wall of plant. In immediate foreground is a punch used for punching material up to 30-in. I beams, channels and miscellaneous material.

Modernization Program Ends

By W. G. PATON

Vice-President,
Austin Co.,
Cleveland

HOW existing facilities can be adapted to meet the problems of mounting production costs and increased volume was demonstrated recently by the Austin Co., engineers and builders, in the revamping of the company's fabricating shop in Cleveland.

Confronted since V-J Day with a large volume of new plant construction for industries whose changing products, methods and distribution problems could not be met in any other way, Austin found that its structural shop would be called upon to assume a larger share of the company's regular requirements in order to supplement the tonnages customarily purchased from other fabricators.

Where 70 pct of the truss tonnage going through this shop before 1946 had been in spans of less than 60 ft, the majority of plants now

being built feature larger spans. Trusses of 60 ft or more, together with jack trusses used with them to eliminate supporting columns, now account for 62 pct of the truss tonnage, which indicated a need for certain structural changes in the plant itself. The company felt that the 30-year old fabricating division plant was beginning to develop bottlenecks which were limiting the production efficiency of their overall operations.

After 6 months of intensive work, the fabricating division is reaping the benefits of improved layout, made possible by several small additions to floor space, and a number of alterations in the building and yard areas. And the result, two production lines in place of one, has given company engineers a shop which they feel sets a new high in structural steel fabricating efficiency.

Four basic alterations and changes in the building and yard were involved. The first two were made in response to the need for relieving congested operations in quarters which had been outgrown.

A 14-ft lean-to (see fig. 1) was added along the 240-ft south wall, to utilize all the space available on this side of the shop. Then three 80-ft jack trusses and two 75-ft spans were installed, replacing two aisles of 11 columns, each 20 ft apart, running the length of the shop. One aisle provided a maximum working space of 50 ft between column, while the other afforded 25 ft between columns.

Construction of the lean-to and installation of five jack trusses increased the available working space in the fabricating area by 6000 sq ft, by eliminating the columns which tended to obstruct and hinder operations, and making available for production that area along the one

this connection is the fact that these new hoists travel directly on the bottom chord of the jack trusses.

The company's third major modernizing step was to spruce up the shop interior. For this purpose the plant was repainted with a specially formulated bright yellow chromate. This material is the same weather-protective prime coat used on all steel fabricated in this shop.

The color has produced a complete transformation in shop appearance, according to company officials and imparts an atmosphere of cheerfulness and cleanliness that would have constituted a marked innovation heretofore in the average structural shop. Yellow apparently exerts no eye-tiring influence and presents no glare problems, which would be serious in a welding shop like this.

Serviced by a traveling bridge crane, 210 ft long with a 65-ft span, equipped with two 10-

Fabricating Shop Bottlenecks

Combining modern material handling techniques with improved plant layout is enabling the Austin Co. to meet mounting production costs and at the same time increase output. As a practical demonstration of what can be accomplished by applying modern methods to the processing of such essentially job-lot products as fabricated structural steel, the description of the Austin Co.'s project given in this article is must reading for today's harassed production engineers.

wall previously occupied by certain shop facilities not directly related to production, which are now accommodated by the lean-to.

Movement of material in process from one side of the shop to the other, once difficult because of the obstructing effects of the columns, is now performed faster and more easily in the area. Also, six additional 2-ton lowhead-type electric hoists, shown in fig. 2, have been installed, making a total of 24 such units now serving the shop. An interesting sidelight in

FIG. 2 - One of the 24 electric hoists which expedite handling and movement of material throughout the shop and save time and manual effort in fabrication. Here an I beam is being removed from a punch press.



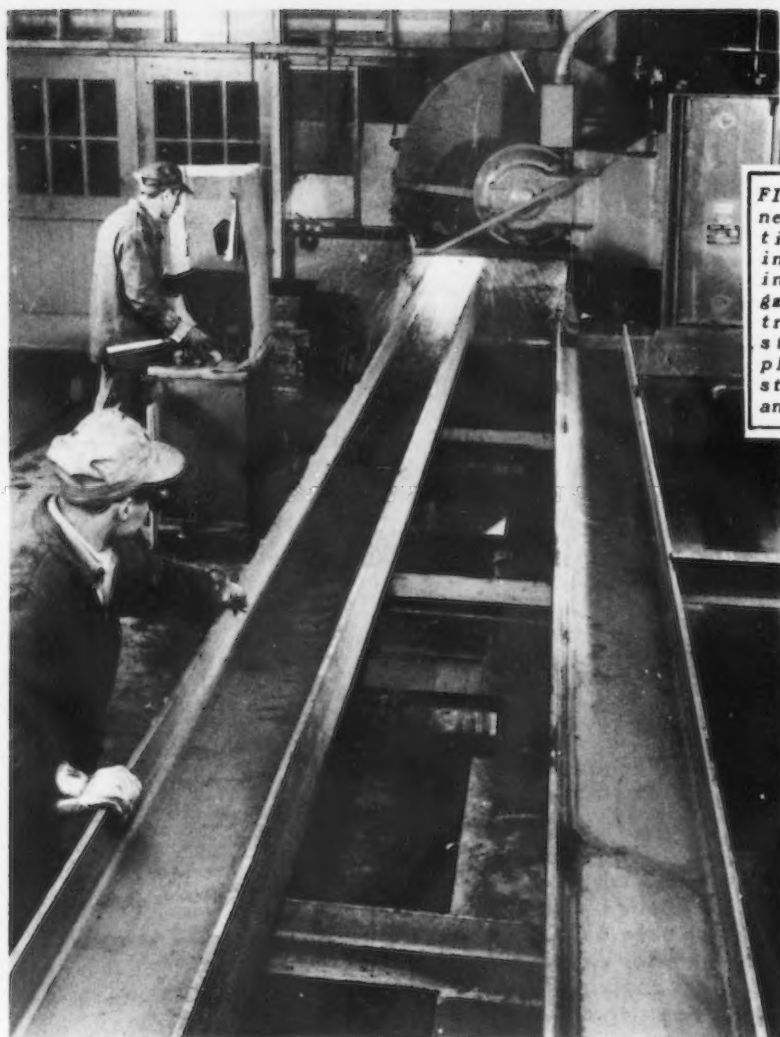


FIG. 3 - Installation of new friction saw for cutting sections up to 30-in. was one of the steps in the modernizing program. Unloaded by a traveling bridge crane, structural shapes are placed on ball-bearing steel rollers shown here and fed to the power saw.

ton trolleys and a 660-ft monorail of 4-ton capacity, the receiving and storage yard likewise reflects a number of improvements which have encouraged more efficient operation.

The southeast section of the yard has been brought up to the floor level of the shop. Formerly 2 to 3 ft below floor level, it was filled with stone and slag and a portion of it concreted. Also, a new friction saw, shown in fig. 3, was installed at the shop entrance to handle 30-in. I beams and all sizes of channels. The unit formerly employed for this operation, relocated and installed 70 ft east of the new saw, is now used for cutting detail beams and channels.

The company has streamlined the production layout of its own structural steel fabricating shop to capitalize to the fullest extent on the efficiencies of a straight-line system in which both mechanized and manual material handling methods are integrated.

Upon receipt by rail at the east end of the shop, steel is unloaded from gondola cars by the traveling bridge crane. It goes either into production immediately or into yard storage to await subsequent processing.

On arrival, I beams and channels up to 30-in. size, scheduled for fabrication into beams, columns or truss members, are placed on ball-bearing steel rollers mounted in a rigid frame and solidly anchored in a concrete foundation. This installation (see fig. 3) covering a distance of 60 feet, serves the new friction saw, which cuts the steel to desired lengths. Smaller sections for detail beams and channels are placed on the other rollerized conveying unit feeding the second power saw. Material for yard storage is placed on a shop truck that travels on standard gage rail and is pushed 60 ft to the 660-ft monorail crane, which carries and stacks the steel in the yard.

After friction sawing, I beams move into the shop over another set of steel rollers, and detail beams and channels are trucked into the plant to the abrasive saw. This rail track, laid flush with the concrete floor slab, which is one feature which distinguishes this from most other structural shops, runs from the yard through the entire length of the shop to the painting and loading department, directly serving all fabricating areas, which are laid out in a straight

line running from east to west.

Hoisted to a layout skid, the material is marked with templates or by hand for hole punching. Punches of various types and sizes are located at strategic points in the shop for use in these operations.

The second fabricating line starts at the template shop and, like the first line, it also is served by an intra-shop railroad track. These two lines running through the shop are served at different points by overhead electric hoists (fig. 4), thus making possible great flexibility in the handling of material through and across the plant during the various stages of fabrication.

For assembly, H-truss members are simply laid in place in horizontal jigs at the head of each fabricating line. The chords are placed with monorail hoists; the short members generally are so light that two men can place them quickly by hand.

After tack welding, each truss is removed from the jig and stood on its bottom chord. Monorail hoists hold it at the top. After the bottom chord joints are finish welded, the truss is turned upside down for welding of all top chord joints. This procedure makes possible 100 pct down-welding.

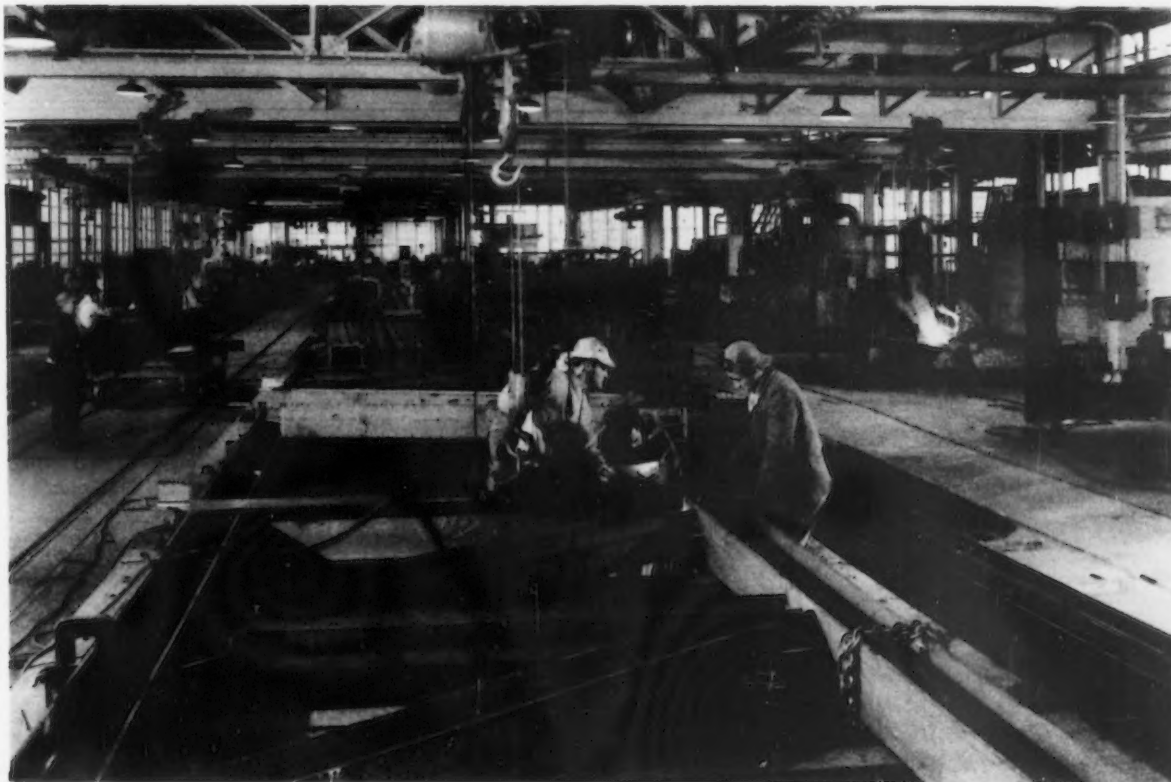
With the truss being completely fabricated from rolled members cut to desired lengths as

previously indicated, no splitting, blocking, slotting or chipping is required. The fillets, ranging from $\frac{1}{4}$ to $\frac{3}{8}$ in. are run completely around the members at their end connections, covering all cut edges and leaving only the original smooth, hard, rolled surface exposed. As a result, corrosion resistance is increased, and painting and maintenance of the truss simplified. A total of 23 machines is available to handle this production welding.

Trusses or other structural members, now welded and ready for painting, are carried to the painting and loading department, where the members are cleaned by wire brushing and the welds by chipping. Following this surface preparation, the work is spray painted with a special yellow chromate. In fabricated and finished form, steel is then either loaded directly into cars on the rail siding adjoining the shop for shipment to customers or to the yard. Beyond the painting and loading department is a special truss shop where nonstandard structural members are fabricated.

While H-section welded trusses in four standard lengths comprise the bulk of output at the Austin fabricating division, flexibility of the shop layout, fabricating facilities and materials handling enable the plant to handle larger tonnages of nonstandard structural units with the same continuous line production efficiency.

FIG. 4 - Installation of three 8-ft jack trusses and two 75-ft spans made it possible to eliminate 11 columns from this section of the shop. Men shown are working on a special heavy jack truss, one section of which is being supported by the electric hoist.



Metal Coatings by High Vacuum Evaporation

Use of high vacuum techniques for applying thin metallic coatings to metal and nonmetal surfaces holds promise of developing into an important industrial tool. This article discusses briefly some of the fundamental aspects of evaporated coatings, describes units for both continuous and batch type work. The author also comments on the physical characteristics of such coatings and lists some interesting applications of this technique, including the coating of thin plastic sheeting and condenser paper.

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By PHILIP GODLEY
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DURING the past several years the use of high vacuum as a means of improving old processes and performing new tasks has increased very rapidly. This has been due largely to the development of large oil diffusion pumps which are capable of removing large volumes of air from vacuum vessels at high rates. Another important factor in bringing about this rapid growth has been the development of special welding techniques together with a better understanding of high vacuum engineering. This article will discuss one of these processes of particular interest to the metalworking industry—the evaporation of metals.

Fundamentally, evaporation is a simple phenomenon. Many liquids can be readily evaporated at high rates at atmospheric pressure. Many other liquids could be readily evaporated at atmospheric pressure were it not for the danger of chemical reaction with oxygen and other gases in the air. Still other liquids would require that they be raised to extremely high temperatures before any appreciable rate of evaporation would take place.

The rate of evaporation from a surface is dependent only on the vapor pressure of the material at any given temperature. However, the pressure of the surrounding atmosphere influences the apparent rate of evaporation in that a large number of air molecules above the surface will interfere with the passage of the evaporating molecules and drive a large percentage back into the evaporating liquid. Thus, the net transfer of molecules from the surface is small at high pressures and increases as the pressure is reduced.

For substances which react with air at the temperatures required to evaporate them rapidly or which would require an impractically high temperature to obtain appreciable net evaporation rates, it is necessary to reduce the pressure of the surrounding atmosphere. This accomplishes two things: (1) The possibility of chemical reaction with the atmosphere is reduced, and (2) the temperature to which the substance must be raised for it to evaporate at a given rate is lowered.

Under conditions of high vacuum, the evapora-

NAME	Melting Point, °F	Evaporation Temperature, °F at 10^{-3} mm Hg
Aluminum.....	1216	1832
Antimony.....	1166	1256
Beryllium.....	2349	2462
Cadmium.....	608	518
Carbon.....	> 6300	5432
Chromium.....	3452	2336
Copper.....	1983	2318
Germanium.....	1756	2372
Gold.....	1945	2660
Iridium.....	4449	> 4350
Magnesium.....	1204	842
Molybdenum.....	4748	4532
Nickel.....	2646	2624
Palladium.....	2827	2822
Platinum.....	3191	3812
Selenium.....	359	389
Silver.....	1760	1922
Tantalum.....	5162	> 4500
Tin.....	450	2462
Tungsten.....	6132	5790
Zinc.....	788	644
Zirconium.....	3866	> 3600

tion temperature of a substance cannot be definitely defined. Unlike the boiling point of a liquid, there is no definite temperature at which the rate of evaporation suddenly increases. Rather, the rate of evaporation increases gradually as the temperature is increased, and, consequently, as the vapor pressure of the liquid increases.

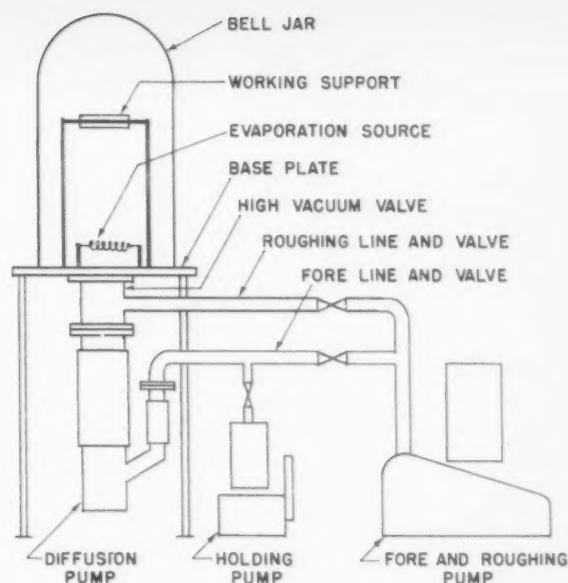


FIG. 1 - Typical laboratory bell jar setup for applying evaporated metallic coatings. Larger units employ the same basic technique.

Attempts have been made to define the exaporation temperature as the temperature at which the vapor pressure of the liquid reaches 0.01 mm Hg¹. This temperature for various metals is

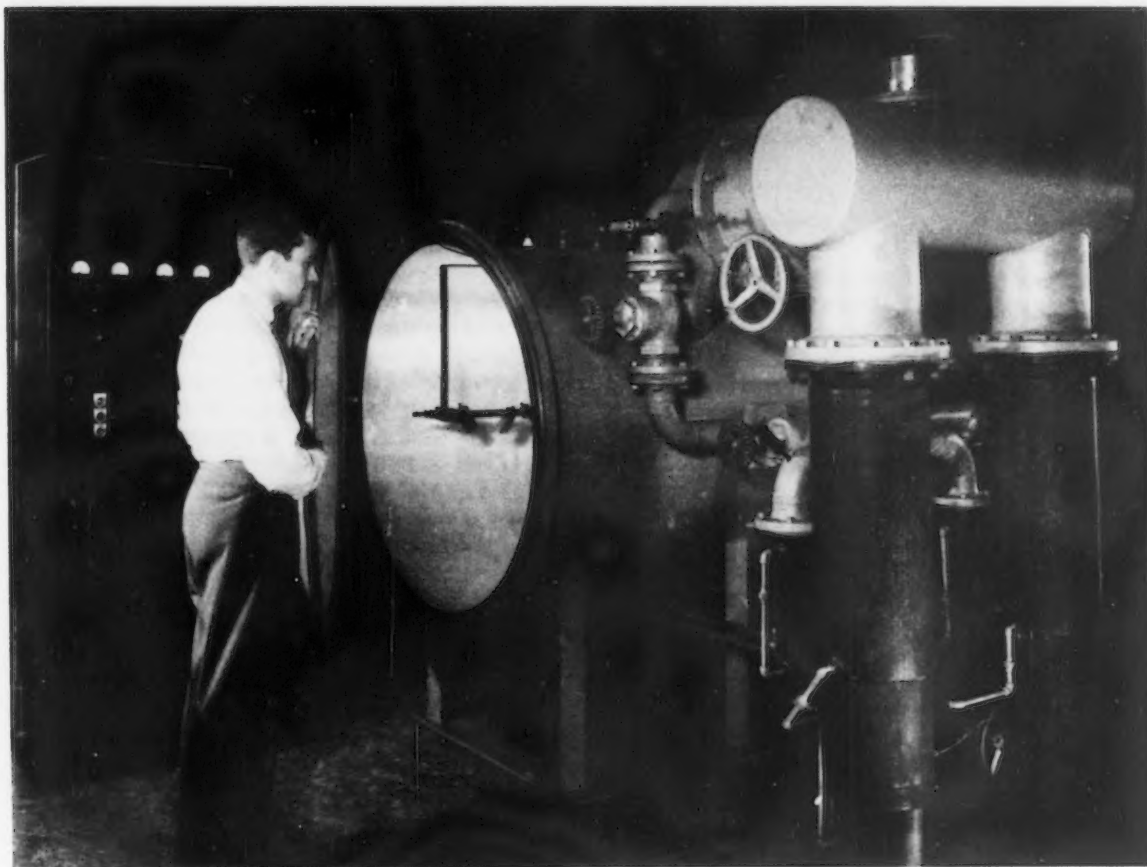


FIG. 2 - An evaporator for applying metallic coatings by the batch method. The rod-like structure visible in the center of the chamber is the electrode assembly for supplying the heating current for evaporation. The diffusion pumps are to the right.

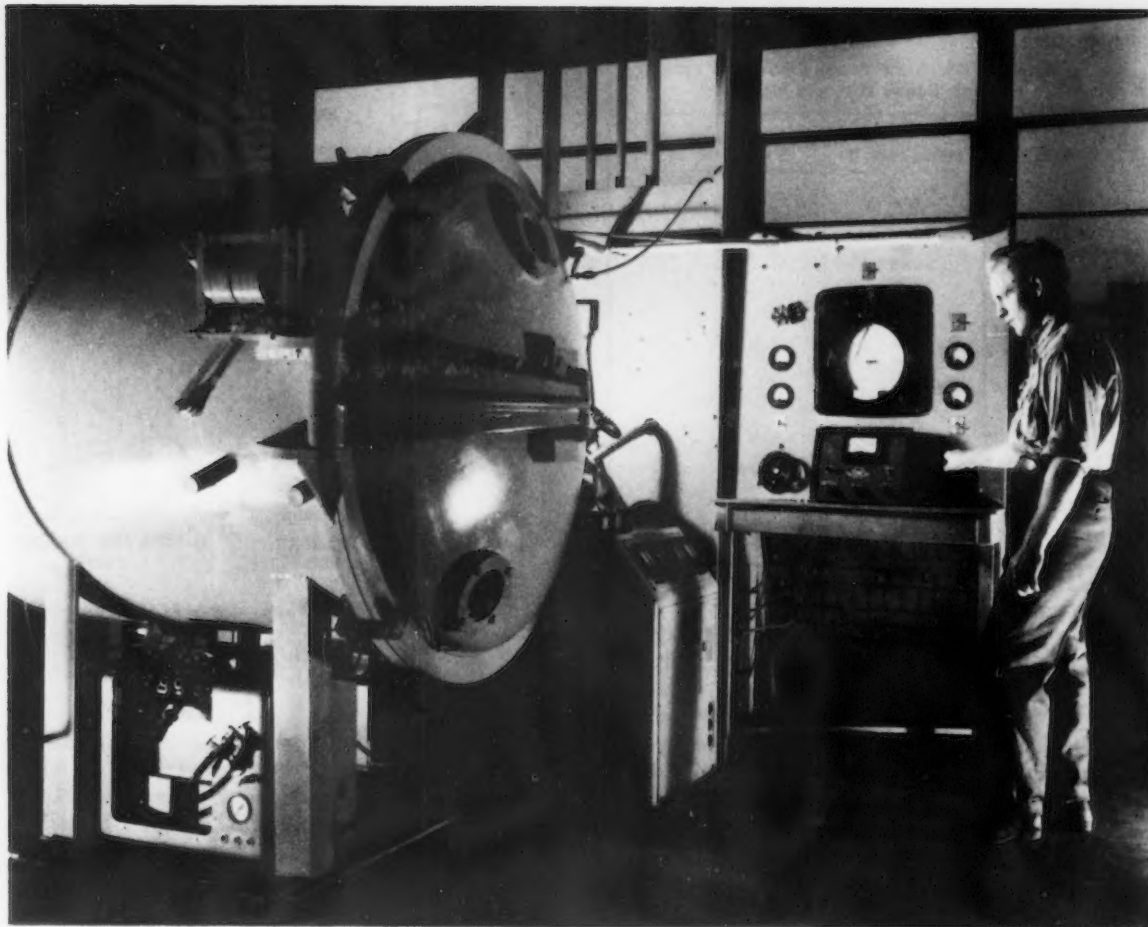


FIG. 3 - This evaporation unit is used for the continuous coating of condenser paper with zinc at linear speeds of 500 ft. per min.

given in table I. However, as the requirements of industry increase and as the technical knowledge of the means of acquiring faster evaporation rates progresses, these temperatures and vapor pressures seem quite low. For instance, National Research Corp. has undertaken the evaporation of aluminum in which the aluminum

¹ John Strong, "Procedures in Experimental Physics," Prentice-Hall, Inc.

is maintained at a temperature of about 2370°F and has a vapor pressure of approximately 100 times that given in table I.

In evaporative coating, evaporation of the coating material is only part of the process. The evaporated atoms or molecules must be permitted to reach the article to be coated without too much interference. It is for this reason that such extremely low pressures (10^{-4} to 10^{-2} mm Hg) are used in the usual evaporation process. It is desirable that the evaporated molecules should not collide with molecules of the residual gas, or any other gases and vapors present in the vessel, in their path from the evaporating source to the article to be coated. Should an evaporated molecule collide with another molecule, it may either combine chemically with the other molecule or it may impart some of its energy to the other molecule. Should the former

occur, an undesired compound would be coated on the article. Should the latter occur, particles of larger than molecular dimensions will be deposited. These large particles will give dull and off-color coatings.

Finally, it is necessary to condense the evaporated vapor on the article to be coated. This is comparatively simple in most cases. The temperature of the article is normally much lower than the evaporating source and, consequently, the vapor condenses on it readily.

Metal coating of small objects, such as small front surface mirrors, molded plastic parts and quartz crystals, may be accomplished in a relatively small bell jar such as is commonly found in the laboratory and which is shown in fig. 1. Attached to the base plate of the bell jar is an outlet leading to a high vacuum diffusion pump which in turn is backed by a rotary mechanical pump designed especially for high vacuum pumping. Commercial equipment designed to metallize large pieces or batches of many small pieces is made using tanks as large as 4 ft diam and 4 ft long. Fig. 2 shows an evaporator used for applying coatings by the batch method. Larger units can and have been made, and to all intents and purposes there is no limit to the volume of the coating chamber. These units are composed of the same essential parts, except that one or more

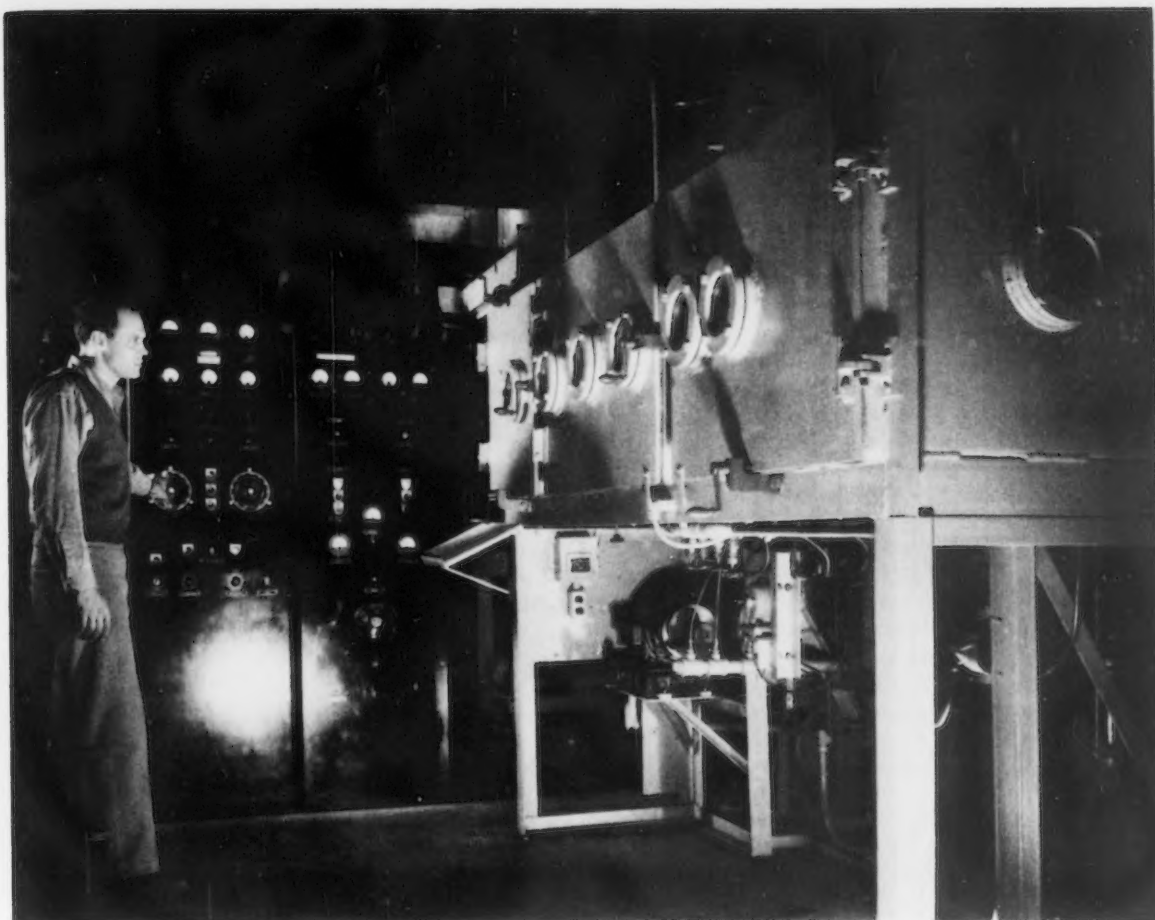


FIG. 4 - A unit for continuously applying metallic coatings to cellophane, this plastic and metal sheet, paper and fabrics under high vacuum.

larger diffusion pumps are directly connected to the tank through a large manifold. The diffusion pumps are again backed by one or more larger mechanical pumps.

It is impractical to rough-down the tank through the diffusion pumps when they are in operation because of the danger of blowing the diffusion pump fluid and its vapor out of the pump and because of the danger of oxidation of the pump fluid. In order to avoid this, most installations either have separate roughing pumps, together with suitable valves in the pumping lines, so that the diffusion pumps may be valved off from the tank during the time when the tank is open for loading and when the tank is being roughed down from atmospheric pressure to less than 1 mm Hg, or have bypass lines direct from the tank to the fore pump combined with the necessary valves. In the latter case a small holding mechanical pump is generally provided to maintain the vacuum in the diffusion pumps until such time as they are opened again to the system for normal operation.

Inside the coating tank there is provided a suitable support for the article to be coated. This support is generally placed above a source of the metal vapor and anywhere from a few inches to several feet away from the source. The source may consist of any of several types of heating

devices depending upon the metal to be evaporated and the desires of the operator.

Some typical sources of metal vapor are:

(1) A helical coil of tungsten wire to which pieces of wire are attached at intervals along the coil. The wire consists of the metal to be evaporated. An electric current is passed through the tungsten coil in order to heat it to incandescence, thereby evaporating the metal. This technique is particularly useful for evaporating aluminum.

(2) A molybdenum, or other refractory metal sheet formed into the shape of a boat with tabs on each end. Pieces of the metal are placed in the boat and the tabs are attached to heavy binding posts. A high current is passed through the boat until it is sufficiently hot to evaporate the metal. Gold, silver and copper are a few of the metals which may be easily evaporated by the use of this method.

(3) A ceramic crucible heated by having a resistance wire wrapped around it or formed with a resistance wire in its walls. The metal is placed in the crucible and heated by conduction and radiation from the resistance wire through the crucible. An alternate means for heating the metal is to surround the crucible with a high frequency induction coil.

A third component in the evaporation chamber

is a means of out-gassing the article to be coated along with the internal walls of the vessel. Since all materials have a layer of adsorbed gases and vapors on their surfaces when allowed to stand for any length of time at normal temperatures and atmospheric pressure, even though they have been scrupulously cleaned, it is necessary to supply sufficient energy to the surface to release the adsorbed layer. This layer consists principally of water molecules, and a common method of supplying the energy necessary to evaporate it is by establishing an electrical (glow) discharge in the tank during the pump-down or roughing cycles. For this purpose an electrode is inserted through the base plate and is supplied by a high voltage transformer. The ions created by the discharge bombard the article and contribute energy to the evaporation of the adsorbed layer.

It is generally not economically practical to evaporate films thicker than 0.001 mm for commercial uses. Also, heavy films have a tendency to peel off whatever material they are deposited on. For most uses, metal films of 0.001 mm or less are quite satisfactory since they are almost opaque. The metal film follows the surface contour of the base material. In the case of flexible materials, there is no stiffening of the material caused by the evaporated film. Since it is so thin, it is not possible to polish it to obtain shiny finishes. However, aluminum and silver coatings on glass, plastics either molded or extruded, and even highly calendered fabrics reflect well over 80 pct of the incident light.

By the use of the electron microscope and electron diffraction patterns, many investigators have examined evaporated films. The observations reported by these investigators vary considerably in details. However, it is generally agreed that the films consist of agglomerates formed by migration of the atoms due to surface forces after the atoms have condensed on the surface. Pickard and Duffendack² have published some excellent photographs of evaporated films of various metals in varying thicknesses. These show the agglomerate formation very clearly.

It is generally agreed that most evaporated films contain some oxides of the evaporated metal. The largest concentration of oxide appears to be in the initial layer deposited plus whatever oxide forms on the surface upon exposure to the atmosphere.

Electrical resistivity of such films is higher than for massive metal. Extremely thin layers show almost infinite resistance up to a finite thickness where the resistivity drops tremendously (by a factor of 10^9 according to Richter³). Probably the agglomerate structure of the film contributes to this. The resistivity of an evaporated aluminum film 0.00002 mm thick is 2×10^{-7} ohm-cm as compared to 2.8×10^{-6} ohm-cm for massive metal. In spite of the extreme thinness,

² *Journal of Applied Physics*, vol. 14, p. 291, (1943).

³ *Kolloid Z.*, vol. 61, p. 208, (1932).

metal films act as a partial barrier to water vapor. In general, however, they are more valuable for their excellent optical properties than for other physical properties.

The original use for the evaporation process was for the laboratory. Aluminum evaporated on the front surface of optical mirrors gives excellent reflection characteristics as compared with the familiar silvered mirrors. There is no interference from refraction, reflection, or absorption from the glass; and over 90 pct of the incident light is specularly reflected. Today, large astronomical mirrors are coated with aluminum by special setups such as described by Strong¹, and continuous, automatic equipment is producing front surface aluminum mirrors for the television industry at a rate of one a minute.

Some light bulbs are coated with aluminum on the inner surface to increase the efficiency in a given direction. In this case, the glass bulb itself is used as the vacuum vessel and the entire inner surface is coated. The aluminum covering the area which is to be transparent is then dissolved away by chemical means. The modern sealed beam headlight is a typical example of this art, wherein the aluminum coating acts not only as a reflector but focuses the beam as well.

Quartz crystals have been coated with gold to lead them to respond to definite frequencies, and silver coatings have been used as bases for soldering electrical leads to these crystals. Silver coatings have been evaporated on mica sheets and these sheets stacked to form high quality condensers.

More recent uses for evaporated metal coatings include molded plastic parts for decorative purposes such as Christmas tree decorations, automobile horn buttons and plaques, costume jewelry. Thin plastic sheeting can be coated with metals; and such products are used for making sequins, decorative ribbons and wrappings, etc.

Condenser paper has been coated with both zinc (see fig. 3) and aluminum for fabrication into oil and wax impregnated paper capacitors. By the use of metal coatings in place of aluminum or tin foil, much smaller finished units are possible. Also the metal coating will burn away from an area surrounding conducting particles or weak spots in the paper should an arc occur through the paper⁴. This leaves an insulating area which extinguishes the arc, and the condenser is said to have self-healed.

Until recently, by far the greatest emphasis has been placed on evaporation by batch methods. Now National Research is adapting the process to metal coating of continuous webs. This work has for its objective the production of metal coatings on rolls of plastic sheeting, cellophane,

⁴ J. C. Balsbaugh and P. Godley, "Electronics," p. 112, April, 1947.

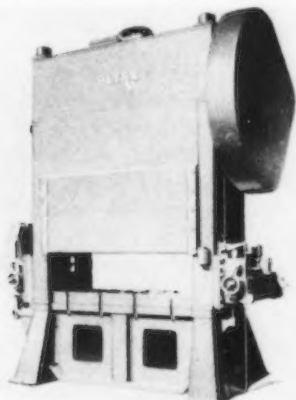
polyethylene, cellulose, acetate, etc., paper, fabrics and thin metal sheet. A machine developed for continuously applying a metallic coating to cellophane is shown in fig. 4. Pilot plant equipment is in operation which can coat continuously 5000 to 6000-ft rolls of flexible material with aluminum, silver, copper or gold in a few hours. Other equipment also in the stage of pilot plant operation will coat 5000-ft rolls of condenser paper with zinc in a few minutes. It is expected that the results of this program will open up many new fields for evaporation techniques.

New Equipment...

A 300-ton high production press, a projection welder, a transmission and absorption dynamometer, hydraulic selector valves, high-speed cylinders, cutting, brazing and soldering torches, an electric switch, and other small tools and accessories are described this week, together with an automatic lubricator, and a protective coating.

300-Ton Press

DEVELOPMENT of the largest press in its No. 600 series of high production presses has been announced by E. W. Bliss Co., 450 Amsterdam Ave., Detroit 2. The new unit is a 300-ton press used to form automotive floor panel reinforcements in eight steps of a



progressive die. The No. 6290-D is completely automatic with double roll feed and scrap shear synchronized so as to feed and trim predetermined lengths. Frame construction is of stress relieved, steel weldments with bed, uprights and crown held together by four pre-shrunk steel tie rods. The press has single gearing with single end drive. The press bed is arranged to receive die cushions. Press speeds range from 30 to 45 strokes per min. Distance between uprights, to clear, 84 in.; stroke of slide is 6 in. Lubrication is by automatic force feed.

Carbide Tipped Reamers

KNOWN as the Ream-Rite, a new line of carbide tipped reamers has been announced by Super Tool Co., 21650 Hoover Rd., Detroit. The line is available from stock in sizes $\frac{1}{4}$ to $\frac{5}{8}$ in. These reamers are not designed for line reaming setups,

but are suitable for automatic and hand screw machines and work that does not require a long flute to operate through bushings.

Projection Welder

A PROJECTION welder designed to keep power demand to a minimum, to give higher electrical efficiency at this low power demand, and to assure equalized welding force over the weld area has been designed by Taylor-Winfield Corp., Warren, Ohio. The

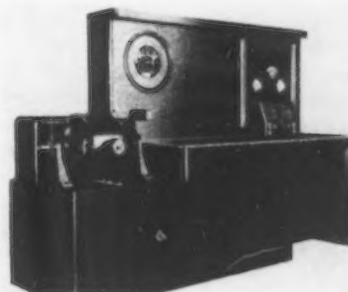


welder, rated at 150 kva and delivering 58,000 amp with a power demand of 348 kva at 61 pct power factor, was designed to projection weld electrical terminals to refrigerator motor housing cases. A special divided secondary with a low impedance permits higher electrical efficiency with low power demand. Because of the box-type frame design, deflection is minimized. The design of the welder permits many applications and can be had with rocking or stationary lower electrode holders. The upper electrode holder is raised or lowered by an air cylinder through heavy-duty

guide bearings insulated from the upper electrode. A T-W transformer can be positioned in the frame to facilitate pass-through operation in production.

Dynamometer

WITH a speed range of 200 to 6500 rpm, a 25-hp transmission and absorption dynamometer has been announced by Electro Mechanical Devices Co., 49 Selden



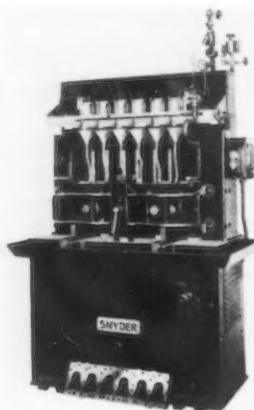
Detroit 1. This model E is designed for testing gasoline engines, electric motors, air compressors, fluid motors, fuel pumps, and gear pumps. It is a completely self-contained unit, with the motor generator set mounted and wired in the base, thus eliminating installation costs as the user need only connect the three-phase wires and lag the unit to the floor to make it ready for operation. One control is used for all tests; no switching is necessary to go from motoring to absorption. The change is made automatically when the rheostat control increases or decreases in relation to the speed of the unit being tested. Torque is read clockwise directly in foot pounds.

Cylinder Head Tester

PRODUCTION of 60 pieces per hour at 80 pct efficiency is claimed for an automotive cylinder head testing machine developed by Snyder Tool & Engineering Co.

3200 E. Lafayette, Detroit. The cylinder head unit is clamped in the fixture by air-operated clamps.

A valve is operated which fills the series of metering glasses along the top of the machine with compound-treated water and a valve



then opens each glass and allows the liquid to pass into the cylinder head combustion chamber. This liquid rises in the glass gages, registering the volumetric content of each combustion chamber. Air is displaced to prevent bubbles from forming in the head, which would cause inaccurate reading. At the completion of the metering cycle, liquid is drained into a tank and pumped up to a reservoir above the metering glasses.

Non-Slip Collets

A COMPLETE line of spiral-grip, non-slip collets has been introduced. The gripping surface is serrated but do not track, having a pipe-vise grip rather than a compression grip. Under extreme torque, these collets slip from one contact to the next raising a minute burr. Due to the thread lead, this burr ahead of each serration pyramid causes a "stripped thread" reeze, locking the stock in the collet instead of cutting groove or pinning free. The serration contact being blunt and the thrust direction at right angles to the bar axis, the stock cannot follow the thread lead in a die action. *Shell Machine Co.*, 21306 John R. St., Hazel Park, Mich.

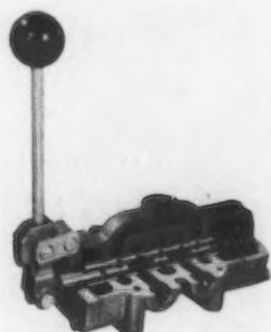
Solenoid Contactors

INTENDED for use in ac motor controllers, but also suitable for application in resistive heating controls and lighting controls for remote and automatic load switching purposes, ac solenoid contactors,

size 2 Bulletin 4452 and size 3 Bulletin 4453 have been announced by *Ward Leonard Electric Co.*, Mt. Vernon, N. Y. The unit features compact construction, accessibility of parts, built-in solderless connectors, and double break silver contacts. All parts are arranged on a steel mounting plate. Units have maximum ratings of 25 and 50 hp on 440-550 v, 3 phase, 60 cycles.

Hydraulic Selector Valve

A SERIES of hydraulic 4-way selector valves for industrial use is in production at the Burbank, Calif. plant of *Adel Precision Products Corp.* It is designed for 1000 psi pressures for control of one double acting cylinder, or two single acting cylinders. The spool-type construction permits a wide variety of porting arrangements for either open-center or closed-center hydraulic systems. The spool is completely balanced axially as well as radially so there is said to be no possibility of spool movement caused by surge pressures in the reservoir return line. The valve is equipped with interchangeable



end caps to provide the placing of the operating lever at either end at any one of four radial positions. The valve, offering a variety of models to meet all operating conditions, is manufactured in 1/4, 3/8, 1/2, 3/4 and 1-in. pipe thread port sizes with flows to 32 gpm.

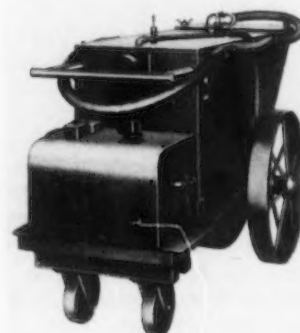
Duplex Micrometer

MODEL L longitudinal duplex micrometer has been added to the Rimat line of micrometers, according to an announcement by *Richards Machine Tool Co.*, 124 S. Isabel St., Glendale 5, Calif. This instrument is designed principally for inside work, to take both inside and outside measurements of grooves and flanges on the inside of

a bore. It is sufficiently small to reach into a hole or opening down to 1/2 in. Measurements are readable while the instrument is held in place.

Sump Cleaner

A REDESIGNED sump cleaner marketed by *Honan-Crane Corp.*, 910 Sixth St., Lebanon, Ind., for



removing chips, grindings and other contamination from quench and settling tanks is claimed to clean an individual machine in 10 min. or less. The cleaner transfers oil or coolant from sump to tank by vacuum without passing contaminated liquids through the pump. A 3-way valve changes suction to pressure, permitting the unit to be used for dispensing clean liquids as well as removing dirty liquids. When tank is filled motor and pump units are automatically cut out by a mercury contact mechanism. Two sizes are available, with either a 80 or 125 gal. capacity. The unit is powered with a 1/2-hp repulsion induction motor.

Plastics Cutting Saws

CIRCULAR cutting saws of high-speed steel for cutting plastics and soft metals without overheating or galling are being marketed by *Reltool Corp.*, Milwaukee. These plastic slitting saws are hollow ground with a deep dish clearance on the sides to eliminate friction, reduce galling and generate less heat. Teeth are ground with alternate right and left-hand pitch with extra clearance on ground lands to assure free cutting and easier elimination of chips.

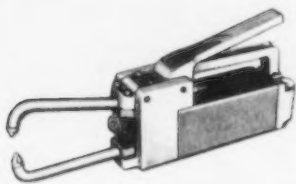
Stainless Cutting Torch

ANNOUNCEMENT of a hand torch for cutting stainless steel using the flux-injection process has been made by *Air Reduction Sales Co.*, 60 E. 42nd St., New

York 17. The torch, designated in its 21-in. length as Style 9016, is also available in a 36-in. length. Both are equipped with a 90° torch head which is made of Monel metal. Tubes are stainless steel as are the lever and ribbed handle. The unit features remote control cut-off to coordinate flux feed with the cutting oxygen and eliminate separate flux control.

Spot Welder

A 23-LB. portable spot welder for sheet metal shops, body shops and other welders of light gage metals has been produced by *Miller Electric Mfg. Co.*, Appleton, Wis.



The unit is said to weld up to 1/8-in. metal and is suitable for galvanized iron spot welding. In operation the welder is held in position, the tong lever pushed down and the switch turned to accomplish the spot weld. Regular models are built for use on 220-v lines and units for 110-v lines may be obtained. Tongs measure 6, 12 or 18 in.

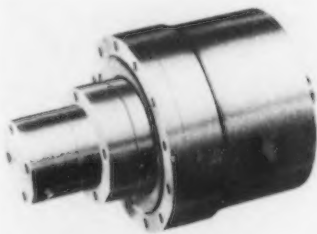
Small Torch

FOR light brazing or soldering operations, Model 3401 four-in.-one torch which can be used with any practical fuel gas such as acetylene, natural gas, city gas or liquefied petroleum gas in combination with compressed air or oxygen, has been announced by *Victor Equipment Co.*, 844-854 Folsom St., San Francisco. The torch is well balanced for sure control during delicate heating jobs. The molded plastic handle is shaped to fit the hand. Needle valves are conveniently located for finger tip control and the parallel grip may be easily clamped in a small vise or special fixture. The torch is furnished with three tips and a 4-way wrench.

Air Cylinders

A SERIES of high speed air cylinders has been added to the line of air-operated power chucking equipment manufactured by *Cushman Chuck Co.*, Hartford, Conn.

Cylinder bodies are aluminum alloy forgings of high tensile strength and are finished with lapped bores assuring an efficient air seal. After assembly, the cylinders are statically balanced to eliminate vibration



at high operating speeds. Air ports are larger than previous specifications, resulting in rapid movement of the piston and speeding up the chucking of work pieces on short run operations. The air seal is a piston fitted with a Graphitar disk which forms a positive seal with two annular rings that are integral with the end of the piston thus providing balanced air pressure on both sides of the air seal. A light load on the seal is maintained through spring measure. Cylinders will be available in the 4½, 6, and 8-in. sizes. They are guaranteed to function satisfactorily at speeds up to 3500 rpm.

Stock Pusher

A STOCK pusher that will feed to the very end of the stock has been announced by *Sheffer Collet Co.*, Traverse City, Mich. Identified as Economy stock pusher, it features a dual bearing, one in the mid-section and one in the nose, an arrangement providing 50 to

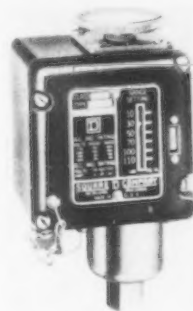


100 pct more bearing length with a corresponding lighter spring tension requirement in each bearing section to accomplish positive feed. This type pusher is adaptable on long feed-outs where feeder travel is greatly accelerated, the slippage and bounce-back, normally encountered under these conditions, is eliminated. Economy pushers are furnished for any stock size, 1/4 in. and upward, for any machine, and

are made of alloy steel. All threads are ground from the solid, after heat treat, and are held to uniform No. 3 fit.

Electric Switch

FOR the machine tool and welder industries, *Square D Co.*, 4041 N. Richards St., Milwaukee 12, has developed a switch designed to cover the range of applications encountered in the control of pneumatic or hydraulic machines. Specifically, the switch is designed for the control of welding equipment circuits, machine tools and high



pressure lubricating systems. A single-pole, double-throw snap switch mechanism is employed to assure quick make and break action. Separated, non-overlapping normally open and normally closed circuits with double-break silver contacts are provided. Operating rates up to 300 per min without false operation or flutter are reported. Switch action may be observed through a trip indicator which operates behind a window in the cover. Bellows-actuated types are available in a variety of ranges up to 1000 psi. Piston actuated controls for use in the hydraulic field are said to be suitable for pressures up to 3000 psi.

Forge Hammer Packing

A PACKING developed to resist vibration produced by drop forge hammers and designated as Daniel's P.P.P. Special No. 183 is now available from *Quaker Rubber Corp.*, Philadelphia 24. This packing is said to provide a sliding-wedge action which absorbs impact without breakdown and which seals itself against the piston rod when pressure is applied to eliminate leakage of steam and condensation drip. When pressure is released on the return stroke the packing returns to its normal shape. The packing is said to be self-lubricated

and will not harden or dry out. It is available in a range of sizes from 3/16 to 1 1/4 in. in multiples of 1/16 in. The packing is also available from 1 1/4 to 3 in. in multiples of 1/8 in.

Cutting Base

ANTISEP all-purpose base is a new cutting base, high in both sulfur and saponifiable content, developed by *E. F. Houghton & Co.*, 303 W. Lehigh Av., Philadelphia 33. It can be diluted with either oil or water and used as a soluble oil on the most difficult machining operations, and is a good drawing compound. Its chemical properties are not changed, even when diluted with a high percentage of water. Its reported advantages include: A single, concentrated product, reducing inventory, storage and handling; high in refrigerating qualities, allowing high machine feeds and speeds, better finish, cool work, longer tool life and no "blue" rejects; satisfactory lubricating properties, even with water, to protect valuable bearing and spindles of automatics; and high rust preventive properties, preventing corrosion, staining or pitting of parts. It will not promote the growth of bacteria or turn rancid, and because of its ready emulsibility with water, it is easily cleaned from the work. It can be used in more than 90 pct of metal cutting and forming operations, including general machining, stamping and drawing. As a drawing compound it can be used straight, diluted with oil or water, or a combination of both, according to the severity of the particular operation involved.

Automatic Lubricator

DESIGNED for installation within small machines, the type M lubricator can oil up to 100 bearings with measured regularity, according to the manufacturer *Bijur Lubricating Corp.*, 43-01 22nd St., Long Island City 1, N. Y. Automatically driven by the machine, this cyclic unit develops an average discharge pressure of 40 psi, and discharges from 2.5 to 5.5 cc at each pump impulse. The discharge volume is adjustable. Used in conjunction with a meter-unit distribution system, the type M unit delivers small quantities of oil under accurate control to all bear-

ings, gears, and way surfaces of a machine at pre-determined intervals. The lubricator, a completely automatic unit, is available in several reduction ratios permitting the selection of the correct rates to accommodate the drive speed and the lubricator cycle time desired, and in both left-hand and right-



hand drives. The pump unit of the lubricator may be mounted in a built-in reservoir integral with the machine to be lubricated, or it may be furnished complete with the standard reservoir. Volume of the standard type M reservoir is 473 cc.

Socket Wrench Attachment

ANY 1/2-in. drive socket wrench handle or attachment can be converted into a ratcheting device with a new tool, known as the Ratchetor, announced by the *Plomb Tool Co.*, Los Angeles 54. The tool has a 1/2-in. sq. plug with ball-check for holding a socket wrench, a 1/2-in. sq. opening for insertion of a handle or attachment and a reversible ratcheting mechanism. It is a



simple positive-acting device, built for high torque strength. Thirty-four ratchet teeth provide positive engagement every 10 1/2°. The reversing lever acts directly on a pawl, eliminating a separate cam mechanism and the possibility of misalignment and malfunction.

Protective Coating

PROTECTION for metal, wood, leather and fabric surfaces exposed to corrosion and deterioration caused by moisture, acids, alkalis, alcohol, dyes, and dirt is offered by *State Chemical Corp.*, 1265 Broadway, New York 1, with the introduction of Permacote. This coating which is applied by brush, spray or dip is said to form a tough transparent coating which remains permanently flexible and resistant to abuse from chemical or physical action. The product is also described as resistant to extremes of heat or cold and is said not to crack or chip from contraction or expansion of the surface it protects. The coating is claimed to impart a luster to the surface and to seal and protect the life of paints, lacquers and varnishes. It is available in 1 and 5-gal. cans and 50-gal. drums.

Parts Conveyor

FOR heavy duty use in handling sharp metal parts and heated material, *Howard Engineering & Mfg. Co.* has announced a parts conveyor which utilizes a steel link type conveyor belt. The standard model is 8 ft 6 in. long with a 16-in. wide belt. Loading height is variable from a 9-in. minimum to a maximum of 24 in. Discharge height is adjustable from 70-in. maximum to a minimum of 33 in. The conveyor is designed to discharge into a 54-in. tote box for foundry work. Longer or shorter units with a range of belt widths can be furnished to order. Standard belt is constructed of 16 gage steel stampings spaced to provide a mesh measuring 9/16-in. sq. Steel cleats are provided to prevent back-sliding at steep angles of incline. The standard unit is driven by a 1/4-hp gearhead motor which provides a surface speed of 40 ft per min.

Roller Bearings

ANNOUNCEMENT of a 25 pct increase in the radial and thrust load carrying capacities of its line of tapered roller bearings, has been made by *Timken Roller Bearing Co.*, Canton 6, Ohio. This increase is based on several factors including improved alloy steels made specifically for anti-friction bearings, better metallurgical control, improved surface finishes and more accurate inspection methods.

WHEN

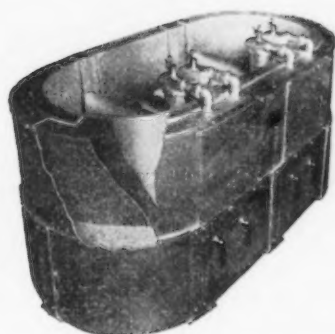
You must cut dross losses . . .

It is costly to
hand-nurse temperatures . . .

Fuel costs are
burning up profits . . .

THEN

**Kemp Immersion Heating
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NAME

POSITION

COMPANY

PLACE

Assembly Line . . .

WALTER G. PATTON

• Coal strike seen as formidable barrier to auto output . . . Hudson nets \$5.7 million . . . Packard also shows 1947 profit . . . Paid lunch periods out at Ford.



DETROIT — With newspaper headlines calling attention to gathering war clouds and hinting at a possible rearmament boom, the auto industry was going quietly about its business this past week of building cars and introducing its newest postwar models.

At the moment the industry is more impressed with the demonstrated ability of John L. Lewis to halt its production lines than with any sinister ideas that may be lurking in Joe Stalin's head. Past experience has shown that any break in the flow of steel to the auto capital is usually followed by auto plant shutdowns. To most car builders this seems at the moment to be of greater importance than the possibility that a large rearmament program may suddenly be imposed on the national economy, diverting precious materials from assembly lines now turning out millions of products of peacetime applications.

The industry is not ignoring the possibilities that are inherent in today's explosive foreign situation. Steel buyers here recognize that even a large-scale aircraft production program may require the use of a considerable number of electric steel furnaces now engaged in the production of low carbon ingots

that are subsequently rolled into flat steel for automobiles. With the industry pressing so strongly for steel supplies even the loss of these "marginal" amounts of steel could slow down the car production appreciably.

What the industry appears most concerned about is the possibility that a large scale tooling program and even a limited program for production of guns, tanks and ships may be undertaken. Informed sources here believe this will inevitably place the U. S. economy in a state of half-rearmament, half peacetime production, a situation that quickly became intolerable months before World War II became a reality.

Recent reports in the press that steel producers have been notifying their distributors to prepare for "advancing prices, scarcities and allocations" appear to most Detroit sources to be slightly emotional and a little behind the times. As these sources point out, the threat of advancing prices, scarcities and allocations have been with the industry for months. Happily these conditions remain only a threat, although admittedly the pressure for allocations to the oil industry has been a source of growing concern here. However, until the coal strike came along and the recent war scare added fuel to the fire, many steel buyers here were beginning to feel that the demand and supply of steel would actually be brought into balance before the end of the year, just as the steel industry has been promising it would if steady steel production at high levels could be maintained over a period of several months.

"Certainly," one source told THE IRON AGE, "the threat of higher steel prices is less today than it was a few weeks ago although there is always the third round of wage increases to be considered. Steel is still tight, but there are indications that improvement in the situation may be closer than some of us think. Also, until allocation programs are finally approved and actually become bona fide threats

to steel supply lines, I'm refusing to worry about them."

WHILE not typical of Detroit's view of the present situation and future prospects, the above comments are indicative of the fact that Detroit executives are not being carried away by the war being heard at every hand. Auto managers are, however, acutely conscious of what a rearmament program could do to the plans for postwar cars they have been carefully formulating for more than 2 years and on which they have already bet several hundred million dollars. If these plans are swept aside by critical developments in the world situation it will be as cruel a blow as the industry has ever had to absorb.

"At this moment," one source said, "it would be nice to know whether we're building our first postwar car or our first prewar car." * * *

Automobile producers continue to report earnings well above the 1946 totals. In its message to stockholders released this week, Hudson Motor Car Co. reports consolidated net income of \$5,763,352, after interest, depreciation and taxes. This is equivalent to \$3.17 per share compared with \$1.51 per share earned last year.

Commenting on the report, A. E. Barit, president and general manager, explained the full extent of Hudson's progress in 1947 is not reflected in the financial figures because one of the highlights during the period was the introduction of a completely new model which will considerably influence the company's future.

Mr. Barit called attention to the fact that production has been hampered by material shortages and work stoppages, but despite these interruptions 1947 production was 10 pct ahead of 1946. He explained that output of the new model has increased steadily until production today is approximately the same as the 1947 average output.

Hudson's extensive conversion

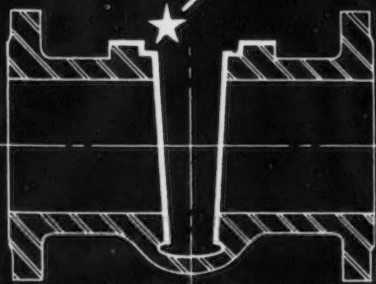
This BULLARD 36" Cut Master is "really paying off" at Newport News Shipbuilding & Drydock Company. Here you see it taper boring a large valve. On this job, it also faces the flange and counter bores, as shown on the cross-sectional drawing. The Cut Master not only saved 33 1/3% on these three operations but also provided such a smooth finish that a grinding operation was eliminated.

**PERFORMANCE REPORT
FROM NEWPORT NEWS
SHIPBUILDING &
DRYDOCK COMPANY**

**CUTS COSTS 2 WAYS
ON CAST STEEL
VALVES
with a 36"
BULLARD Cut Master**

**1. SAVED 33 1/3%
ON 3 OPERATIONS**

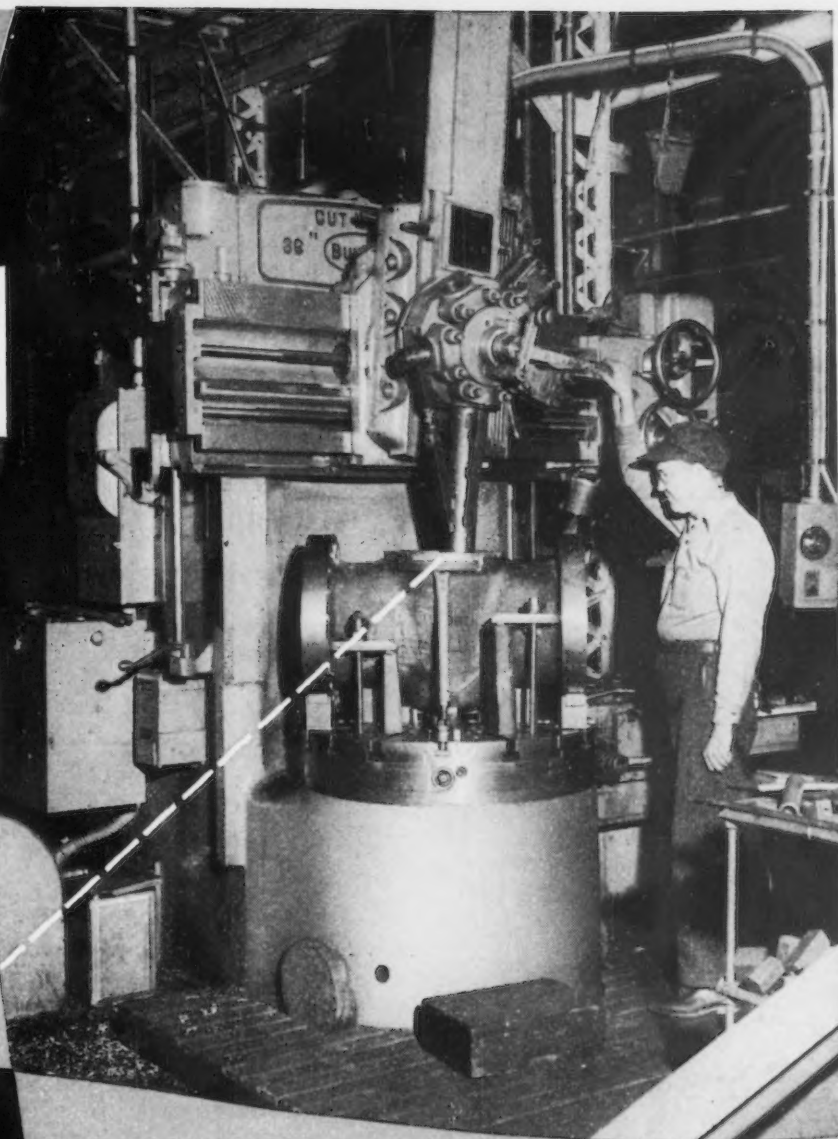
**2. ELIMINATED A
GRINDING OPERATION**



Cross sectional drawing of valve with heavy lines indicating machined surfaces.

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You, too, can expect savings on most of your jobs. It's easy to see why: The bed is cast in one heavy, rigid piece. Spindle is firmly supported top and bottom by large Timken roller bearings. Screw feeds provide and maintain a high degree of machining accuracy.

OTHER COST-CUTTING ADVANTAGES

Because the BULLARD Cut Master was designed specifically to save time on and between cuts, you find other unique features: The rapid and positive speed selection with the BULLARD pendant type control, limit-stops for simplified dimensional duplication, and centralized operating controls speed up operations and conserve costs.

For complete description of these and other distinctive features, as well as data on feeds, speeds and sizes, write for Bulletin CVTL-4-1 today. THE BULLARD COMPANY, Bridgeport 2, Connecticut.

program, including the installation of new single-purpose machine presses, special dies and tools and extensive rearrangement of conveyor and assembly lines has cost the company approximately \$16 million.

TO carry on its expanded operations during 1948 Hudson has recently obtained an unsecured loan of \$5 million from 12 banks.

Total working capital at the year's end amounted to \$27,059,479.

The report shows that Hudson dealers have spent \$60 million on and modernization since 1944. At the present time the company has more than 2800 outlets in the United States and Canada and is represented in 111 foreign countries by 146 distributors.

Mr. Barit explained that in December 1947 a wholly-owned subsidiary, Valley Mfg. Co., was formed to install and operate a hand-type sheet-steel finishing mill at New Castle, Pa., in a plant leased from War Assets Administration. Hudson has guaranteed performance under the lease of the contract for equipping the plant and expects to invest approximately \$2.5 million in new equipment. Production plans for the new mill are not disclosed.

Hudson now has 17,448 salaried and hourly employees on its payroll. During the year 1947 the company manufactured its three-millionth automobile; it is estimated that more than 650,000 of these cars are still in operation.

In his annual report to stockholders, George T. Christopher, president of Packard pointed out that the company's position in 1947 was considerably improved over 1946.

During the year, Packard's total capital and surplus increased to \$60,528,860, a gain of \$1,633,624 over 1946.

Packard reported a loss of \$4,953,808 from its manufacturing operations. However, profits from wholesale and retail operations of sales branches reduced the "loss before tax recovery" to \$1,499,309. Estimated tax carryback of \$2,600,000 converted the operating deficit into a realized net income of \$1,100,691. The addition to earned surplus was \$3,912,325.

Total Packard production of 55,477 in 1947 was 31.8 pct ahead of 1946. Factory dollar sales were up 26 pct over 1946 and inventories

advanced more than \$5 million aggregating \$20,958,609.

Mr. Christopher told Packard stockholders, "The steel shortage hit Packard harder than any other company."

It was explained that three of Packard's main steel suppliers sold their plants; these steel producers had previously supplied 60 pct of Packard's steel requirements. Mr. Christopher explained the company has made significant progress in its steel purchases, "In fact," he added "we already have commitments indicating Packard's 1948 production will improve materially."

* * *

AS a result of a recent ruling by Dr. Harry Shulman, umpire of the Ford-UAW contract, Ford workers will now eat their lunch on their own time. Ford has been the only

Detroit auto producer to pay workers for a 20-minute lunch period.

Prior to negotiations last year, Ford served notice on the union that it desired to discontinue paid lunch periods for its hourly workers. When the company and the union failed to reach agreement, it was decided to submit the question to the umpire.

The union has agreed to abide by the umpire's decision but it is expected that some change in the present Ford contract such as equivalent "rest periods" or "wash-up" periods will be requested by the union when negotiations under the Ford contract begin in July. The fact that union elections are currently being held at the Rouge may account in part for the outburst by the union at the time the umpire's decision was announced.

Housing Shortage Hits Some Steel Companies; Two Pitch In To Help

Pittsburgh

• • • Worker housing is getting to be a serious problem for several steel companies. Carnegie-Illinois announced Mar. 9 that it would put up 38 units to house 456 newly recruited male workers on a site adjoining its Gary plant. In other mills workers have taken time off to build their own homes. Another large steel producer has quietly set up an organization to help builders and contractors get materials for individual employee housing.

In the latter case, the midwestern mill has not publicly associated itself with the expediting program because it feels it can do a better job for its workers by operating quietly. It has a plain office in a downtown building where contractors bring their procurement problems. The company, including the purchasing department, pitches in to get scarce materials. It may have to trade one of its steel products for another scarce item but the result is more homes for the workers.

Carnegie-Illinois' \$292,000 Gary project will consist of one and one-half story frame houses, each containing six bedrooms with bath, shower and lounge facilities. Ten of the units are scheduled for completion May 1.

On one street in Aliquippa, Pa.,

there are 10 houses built by workers of the Jones & Laughlin plant there. Some of the men took a 3-month leave of absence to build their houses. A neighbor in a contractor-built house says the home-made houses are better than his.

Another way steel companies have helped their workers get homes is by knowing the ropes on war surplus housing. One such effort produced Quonset huts for 400 families. The city was persuaded to put in the utilities and a contractor did his job at cost. Then the new tenants marched on the city hall and successfully demanded that the town landscape the project.

Auto Registrations Up

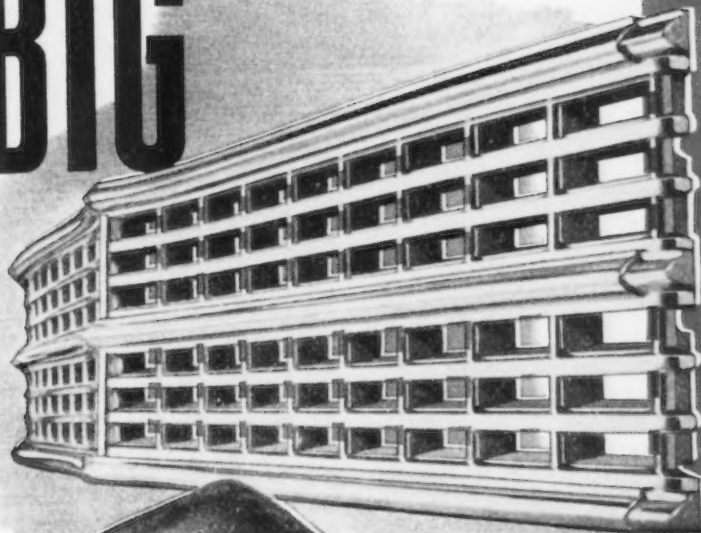
Detroit

• • • January 1948 saw the largest number of registrations of new passenger cars for any postwar month. According to statisticians for R. L. Polk & Co., Detroit, there are strong indications that more than 290,000 new passenger cars were registered during January. Polk's forecasts are based on new car sales in 45 states.

Polk estimates that February registrations will be substantially ahead of 1947.

The agency says that 68,000 new trucks will be registered during January when totals from all states have been tabulated.

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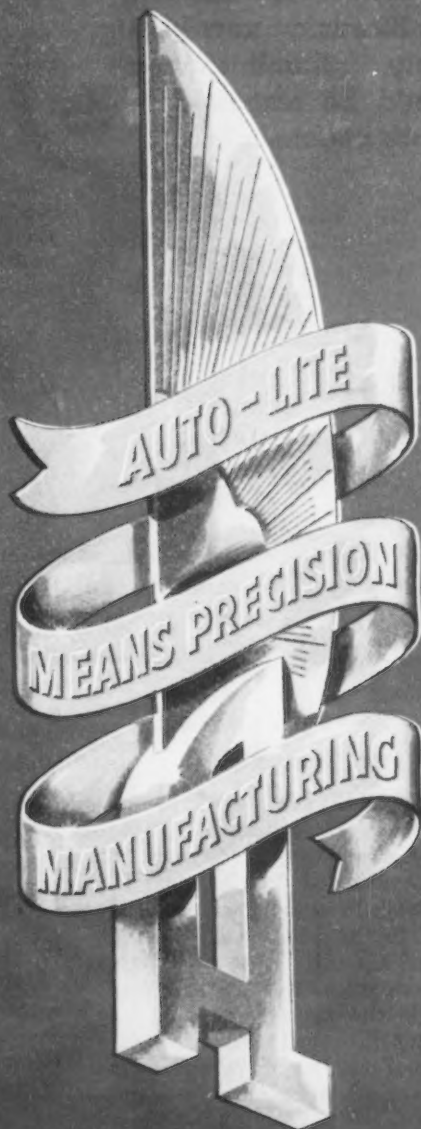
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• Capital thinking shifts on reciprocal trade law . . . Extension now held likely . . . Administration would be restricted in future negotiations.



WASHINGTON — Extension of the Reciprocal Trade Agreements Act beyond its present expiration date of June 12 now appears to have some chance of passage by an admittedly hostile Congress. Up until a few weeks ago, Republican solons felt that the way to handle the problem was to let the matter die quietly. However, international events of recent days have changed this thinking and proponents of a strong bipartisan foreign policy are beginning to win new converts. Their arguments run something like this: With the United States, a creditor nation, ready to embark on a stop-Communism crusade and a strong economic program to put Western Europe back on its feet any attempt to return to high-tariff principles would deal a smashing blow to the solidarity of the Western World.

This train of thought has led Capitol observers to predict that the odds have shifted on further extension of the act which when originally passed in 1934, at the urging of Franklin D. Roosevelt, upset historic precedents by shifting tariff

making prerogatives from the legislative to the executive branch of the government.

While Congress has always complained about giving up its authority in tariff matters, it now appears that the Administration will again be given the power to negotiate trade agreements and reduce tariffs.

However, it is likely that the extension may be for a shorter period than the 3 years requested by President Truman. Some influential Republicans are talking about a 1-year extension with substantial modifications that would restrict the State Dept. in future negotiations. An important change conceded to have a good chance of passage would give Congress the power to pass on any new agreements. Another would give industry recourse to the courts if it was felt that injury had been caused by tariff concessions, provided a satisfactory solution could not be reached through utilization of the existing "escape clause" procedure.

THUS far, there has been no action on Capitol Hill looking toward extension except for the introduction of several bills by both Democrats and Republicans. Some of the bills propose a 3-year extension while others would limit the period to 2 years.

This legislation is before the House Ways and Means Committee, which has not taken any action beyond appointing a subcommittee to study the problem. This subcommittee is headed by Rep. Gearhart, R., Calif.

Even if the act was permitted to die, tariff reductions agreed to at Geneva last fall (THE IRON AGE, Nov. 27, 1947, p. 119) would not automatically be withdrawn by the U. S. This belief is apparently held by some firms claiming to have been hurt by tariff reductions which became effective Jan. 1, as evidenced by some of the correspondence

reaching the government departments.

Actually, failure on the part of Congress to renew the trade agreement powers of the Administration would not in any respect change agreements already made by the State Dept. These agreements would operate as already agreed upon. This also applies to those which are not yet in effect, but have been signed by the participating countries.

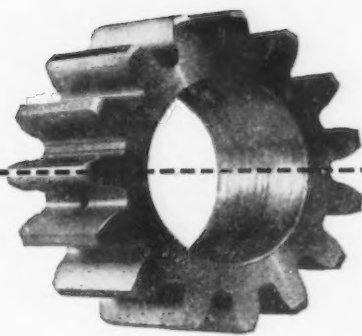
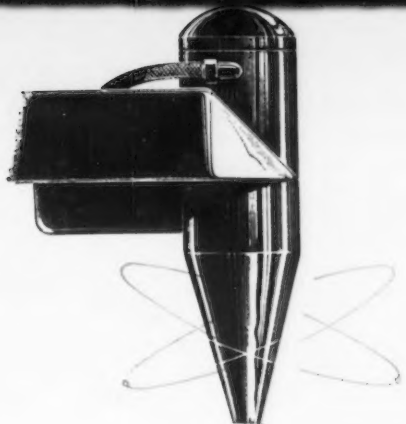
However, the Administration would lose its power to make new or review old agreements. If Congress wants existing agreements changed it would have to let the present act die and then use one of two alternatives—direct the State Dept. to cancel the agreements or pass new tariff laws.

* * *

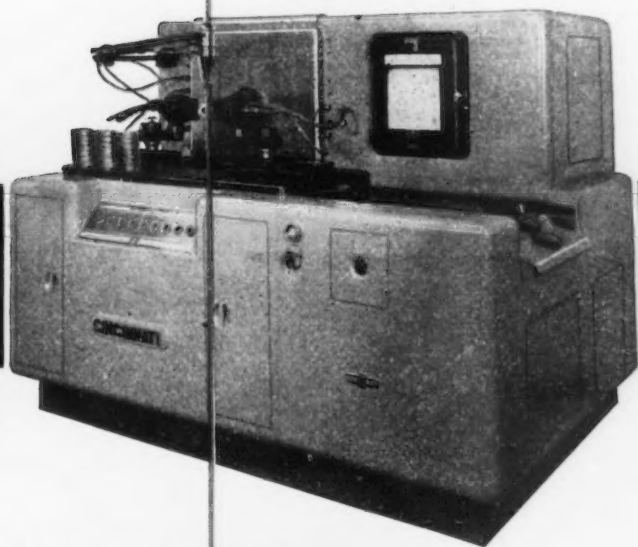
THE War Assets Administration has reported that as of Feb. 16, disposals had been made of 113 projects out of a total of 150 projects covering iron and steel plants and facilities owned by the government. The major part of the 37 projects remaining for disposal are currently under active negotiation, according to Deputy Administrator M. L. Godman.

WAA lists the following companies as having purchased major iron and steel plants and facilities: Subsidiaries of U. S. Steel Corp., Jones & Laughlin Steel Corp., subsidiaries of American Rolling Mill Co., Inland Steel Co., Pittsburgh Steel Co., Republic Steel Corp., Alan Wood Steel Co., Colorado Fuel & Iron Corp., Kaiser Corp., Babcock & Wilcox Tube Co., Timken Roller Bearing Co., Brown Fence & Wire Co., Pacific Tube Co., Plymouth Steel Co., Wallington Tube Co., Superior Drawn Steel Co., Allegheny-Ludlum Steel Corp., International Detrola Corp., Granite City Steel Co., Jessop Steel Co., Koppers Co., Inc., Tennessee Products Corp., Associated Iron & Metals Co., and California Scrap Iron Co.

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The eye does it: the electronic temperature control in the Cincinnati Flamatic Hardening Machine keeps constant watch over surface temperatures, gives you better control of the finished product, lower distortion, and best uniformity with high production than ever before practical with flame hardening . . . Place the gear (other work - pinions, shafts, cams, etc.) on the spindle, press the button, and Flamatic does the rest: quickly heats the surface with oxy-acetylene flames to within plus or minus 5°F of preset temperature, followed by oil quench. Maximum surface hardness can be developed with negligible distortion and without affecting core properties . . . Considering size capacity, versatility, and productivity, Flamatic is definitely low in cost. Check Flamatic for your specific surface hardening requirements.



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Treasury Regulations Present Handicaps to Plant Expenditures

Los Angeles

• • • Treasury regulation and procedures discourage expenditures for plants and equipment, Tell Berna, president, National Machine Tool Builders' Assn., told members of the American Machine Tool Distributors' Assn. at the their Spring meeting here.

Branding the present laws and regulations under which the Treasury operates as "a complex accumulation of improvisations, expedients, compromises and repair jobs going back a century or more." Mr. Berna called for laws permitting the manufacturer to establish his own rates for recovery of capital invested in manufacturing equipment, provided only that they follow a consistent policy from year to year.

He recommended that depreciation in any year is to be taken only to the extent that it results in a tax saving.

"To make a bookkeeping entry of the theoretical reserve for depreciation in a year when that money is not actually earned by the com-

pany results only in increasing the loss which is reported to the stockholders of the company but does not put aside in the bank account money that eventually must be drawn on to buy new equipment," Mr. Berna pointed out.

He singled out Section 102 of the Treasury regulations as especially harmful to American business because it applies "an additional tax on a business enterprise that does not distribute what seems to the Treasury an adequate part of its annual earnings in the form of dividends."

Admitting that the regulation itself is infrequently applied, Mr. Berna said that because of its mere presence on the books, a taxpayer never knows when that "club is going to be brought out from behind the door".

According to Mr. Berna, the taxpayer may learn in 1948 that the Treasury does not approve of his policy for distributing his earnings of 1945 long after the money has been put back into his plant in better equipment and is not available for the purpose of paying a penalty to the United States government.

"It is clearly unwise for small American business to distribute too

much of its earnings in the form of dividends to stockholders when they represent the only way in which that enterprise can be built up and can be kept efficient."

He said the machine tool industry has recommended either the outright appeal of Section 102 or its modification, to apply only to cases of deliberate and proven tax evasion.

Bliss Co. Sells Property

Detroit

• • • E. W. Bliss Co. has completed negotiations for the sale of its remaining property in Brooklyn. Arrangements have recently been made for sale of its seven-story building on 53rd street.

Operations by the Bliss Co. in Brooklyn were halted December 24. Most of the machinery and inventories have been transferred to other Bliss plants.

During the year 1947, \$615,853 were charged against operations to cover the new "plant arrangement."

According to Marshall M. Smith, president, the effect of the charge was to hold indicated net for the fourth quarter to \$50,982 or 14¢ a share. Smith explained that an additional \$1.13 a share would have been available had there been no charge for moving expenses.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



Records Pay Increase

Washington

• • • Straight-time pay for machinery industry workers rose about 9 pct, ranging from 6 to 15 pct, from October 1946 to November 1947, according to the BLS. From January 1945 to November 1947, the increases average 29 pct. Four out of seven plants provide at least six paid holidays while 9 out of 10 provide paid vacations of varying periods, BLS found.

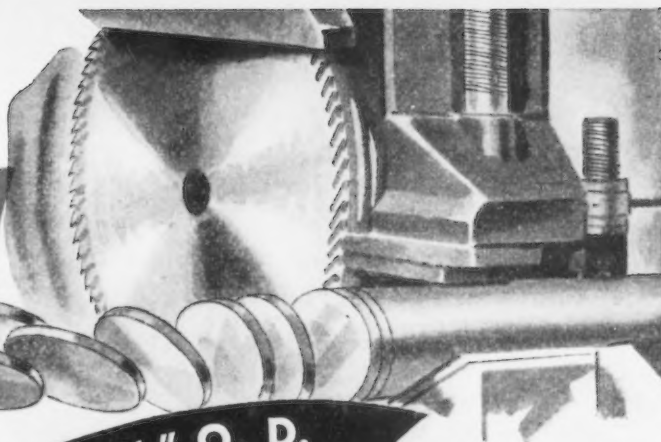
European Exports Slump

Washington

• • • American exports to Europe in January slumped from \$362 million to \$357 million, all countries being affected except England where export value rose from \$58 million to \$72 million and France, where they rose from \$56 million to \$70 million.

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SAWING SAE 1020,

3 1/8" O. D.

Alternate method cut off 260 pieces for cost of blade.
Blade "done for"; no resharpening possible. Total tool
cost per cut off piece, exclusive of labor and overhead—
\$.0174. Total tool cost per 100,000 pieces—\$1740.00.

1 3/4¢ PER CUT

Triple-Chip Method cut off 1728
pieces before blade needed resharpen-
ing. Total tool cost per cut off piece,
exclusive of labor and overhead, includ-
ing pro-rated original cost of blade plus
cost of resharpening—\$.0042. Total tool
cost for 100,000 pieces—\$420.00.

**2/5¢
PER CUT**

Important. Labor and overhead for the "alternate
method" far exceeded those for the Triple-Chip
Method.

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Other Advantages. The Motch & Merryweather
Triple-Chip Method uses circular sawing ma-
chines which have fewer wearing parts in action.
Blade cost is low; blade life is long. Blades cost
next to nothing to maintain; can be resharpened
again and again. Production sawing is four times
as fast, yet ends are square, smooth, accurate to
length. Less floor space is required. Savings, as
outlined above, are enormous.

*Which method is better?
Write for full details today.*

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at Booths 616-618
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Sawing Machine
for stock up to
10-5/8"



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M & M builds
ALL 3:
CIRCULAR SAW
SAW BLADE
BLADE GRINDER

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AT YOUR COMMAND • AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

• Southern California auto production to be second only to Detroit . . . Utah industries developing own power . . . Aluminum fabrication in Northwest on increase.



LOS ANGELES — Four new automobile assembly plants, scheduled to be in operation this year, are expected to bring southern California's passenger car and truck assembly up to the rate of 650,000 annually—second only to Detroit.

Chevrolet has just completed a plant in Van Nuys while Nash announces a fall opening date for its El Segundo Plant. A Lincoln-Mercury assembly unit which will officially open in April, has begun production on a limited scale. Kaiser-Frazer, leasing a portion of the Douglas Aircraft Long Beach plant, is the fourth unit contemplating production.

Ford, Studebaker, Chrysler, Buick Oldsmobile, Pontiac, and Willys-Overland were established here before the war. In the last prewar year, this group assembled 154,000 units annually.

Nationally known makes of automobiles now coming out of this area are Buick, Chevrolet, Dodge, Ford, Lincoln, Mercury, Oldsmobile, Plymouth, Pontiac, Studebaker, and Willys.

Assembly plants are tending to depend more on local parts manufacturers. Ford and General Motors, each with a \$60 million California parts purchasing program, have given impetus to this trend. Other automobile manufacturers

are watching the development of these projects with considerable interest.

Chevrolet's newly opened Van Nuys plant has a capacity of 35 cars and 15 trucks per hour. Employment at peak production is expected to reach about 1500.

At Ford's Long Beach plant, production of passenger cars has ceased in preparation for retooling for the new model to be introduced in June. Production will resume in May, according to present plans. Trucks continue in production, now at the rate of 95 per day. Of the 1500 employees normally occupied in the production of cars at Long Beach, only 900 are at present working on the truck lines.

Lincoln-Mercury production has begun on a very limited scale at the new Los Angeles plant, which is to be formally opened in April. Initial production will be 50 cars a day with gradual increases to 200 daily.

General Motors reports an average employment in this area during 1947 of 3244 salaried and hourly-rated employees, with earnings amounting to \$10,339,969. Included in this group were employees of divisional offices in Los Angeles, and those in the assembly plants of the Buick, Oldsmobile, Pontiac division at South Gate, and the Chevrolet and Fisher Body divisions at Van Nuys.

"Nash-Kelvinator expects to have its El Segundo plant in operation sometime this fall," Campbell Wood, El Segundo plant manager, told THE IRON AGE. Equipment such as paint baking ovens, conveyor systems, assembly lines, etc., are now being installed as rapidly as received from suppliers, Mr. Wood said. Production is to begin in the 475,000 sq ft plant with the Nash "600" and Ambassador series. The company plans to eventually manufacture a line of trucks at this plant. The western area, in the past, has absorbed 11 to 15 pct of the company's total automobile volume. At capacity, the company expects to produce more than 25,000 automobiles annually in the El

Segundo plant.

Studebaker Pacific Corp. announces an anticipated 40 pct increase in employment at its Vernon factory, effective immediately, with hourly rated employees totaling about 550. Production is scheduled to be increased from 68 cars to 96 per day. Assembly operations include the entire Studebaker passenger car line, with the exception of the convertible.

No current Chrysler information is available. Although the company assembles Plymouths and Dodges in Los Angeles, it is understood they intend to move the Dodge line to Oakland, where a new plant is under construction, and to add the DeSoto and Chrysler assembly to its Los Angeles unit.

Davis Motor Car Corp., manufacturers of a three-wheel coupe (see THE IRON AGE, Feb. 26, 1948, p. 100), claims first production models will come off the assembly line in the next few months. When the line is in full operation, the company plans to turn out 50 cars a day, according to a Davis official.

* * *

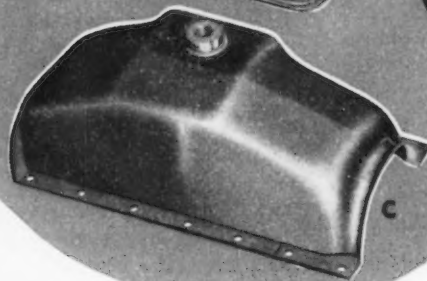
SALT LAKE CITY—With no immediate solution of the mine workers walkout in sight, management of Geneva Steel Co. was preparing to curtail operations to extend its limited supply of coal, which at best was said to be sufficient to last approximately 45 days.

At the onset of the labor stoppage in local mines the plant had enough coal for approximately 15 days of capacity operation at its Geneva and Ironton plant.

While there has not been an acute shortage of electric power in this area, industrialists will breathe a little easier when the diesel driven power plant near Cedar City is completed by Geneva Steel Co. to take care of the requirements of the iron mine operations at Columbia. This unit will have three 750 kw generators and will cost approximately \$400,000.

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equipment is expected to require a full year. On completion it will relieve the demands on the Southern Utah Power Co. whose facilities have been heavily taxed.

It is believed that probably other industrial concerns will install their own power generating equipment as a result of legislation enacted at a special session of the state governing body. Under this new law industrial companies will be permitted to sell any surplus electrical power which they may have to distributing utilities without subjecting themselves to regulation by the state public service commission. This legislation was prompted by the fact that Geneva Steel Co. and Kennecott Copper Corp. can produce surplus power which is badly needed by Utah Power & Light Co. and other small, private and municipal utilities of the state. Industrial companies have been loathe to make such power available if such action would be likely to involve them with the public service commission's regulations.

Kennecott will be faced with a power problem to supply the electrolytic process in its announced copper refinery to be built this year near Garfield, Utah. The company recently completed a 100,000 kw coal plant which will provide

some excess capacity but it is not anticipated that this will be sufficient for the new operations.

The refinery will have an initial capacity of 12,000 tons of refined copper per month, which is more than half of the present output of Kennecott's Utah division. D. D. Moffat, vice-president and general manager, has stated that the cost of the plant would not be known until plans have been drawn and that no definite site has been selected as yet. It is presumed that the refinery will be located near the corporation's mills and the smelter of the American Smelting & Refining Co. on the south shore of Great Salt Lake.

This refinery will be the first for this company in the United States. American Smelting & Refining has one refinery at Tacoma, Wash. and Anaconda Copper Co. operates refineries at Anaconda and Great Falls, Mont.

SPOKANE, WASH.—The recently announced aluminum rod and bar mill to be put into operation here by the Permanente Corp will utilize approximately 60,000 tons of aluminum per year which, when added to the approximate 144,000 tons capacity of the Trentwood rolling mill, will provide an outlet for approximately 204,000

tons of aluminum ingots per year which is approximately twice the capacity of the Mead and Tacoma aluminum reduction plants of this company.

While there has been high expectancy that the aluminum foil mill being imported from Germany and to be set up in California would be located here, the report that the rod and bar mill would be housed in buildings adjacent to the Trentwood rolling mills has somewhat appeased local critics.

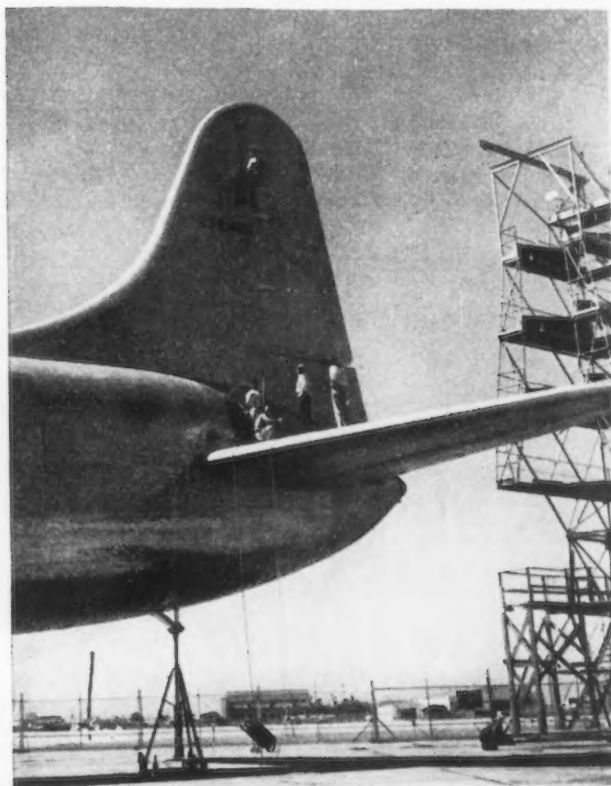
United Engineering & Foundry Co. of Pittsburgh has the contract for the rod and bar mill machinery and initial deliveries are expected to be made about the middle of September but the mill will probably not be in production until the middle of 1949. Equipment on order will produce rectangular, square and hexagon bars up to a maximum 2-in. size and rods in sizes of from 3/8 in. to 7/8 in. in diameter. Permanente's management is giving consideration to utilizing this material for the fabrication of end products such as nails, ornamental trim, farm fencing, flattened wire, welding and brazing rods and rivet stock. The unit will employ several hundred.

Decision to locate the foil mills being imported from Germany at the old magnesium plant of the company at Permanente, Calif., just west of San Jose, was arrived at because of the availability of buildings and facilities there and its proximity to a large market for aluminum foil.

The raw light gauge strip used in the foil process will, of course, be shipped to California from the Trentwood rolling mills here.

The foil plant is expected to arrive within a month or two and installation is expected to begin early this summer with production scheduled for the latter part of 1948. Approximately 200 men will be employed at the foil plant when it is in full operation.

With present demand for aluminum at an all-time high, start of operations of the sixth potline at the Mead aluminum reduction works was very welcome. This unit will add approximately 18,000 tons of pig aluminum per year to the present capacity of the company's operations and will require an additional 36,000 tons of alumina from its Baton Rouge, La. alumina plant.



INSPECTION: The only way to tackle a tail this big is with a block and tackle, according to Convair engineers who were faced with the problem of providing inspection access to the 57 ft tail fin on the Air Force's XC-99 transport. They rigged up a boatswain's chair on the end of a block and tackle and hoisted the block into place by means of a pulley built into the fin.



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CLAYTON R. BURT, president,
Potter & Johnston Co.

• **Clayton R. Burt** has become president of the newly-formed Potter & Johnston Co., which takes over the business of the former Potter & Johnston Machine Co. of Pawtucket, R. I. The entire business has been purchased by Niles-Bement-Pond Co., of which Mr. Burt has resigned his position as chairman of the board. Potter & Johnston will be operated as a Niles-Bement-Pond subsidiary under Mr. Burt's leadership.

• **Douglas Straith** has been appointed field sales and service engineer of the Putnam Tool Co., Detroit. Prior to joining the Putnam organization, Mr. Straith was associated with Republic Aircraft Div., Avco Mfg. Corp., serving the past 7 years in its tool engineering and purchasing divisions.

• **J. E. Sawtelle** has been appointed manager of the export division of the Hinderliter Tool Co. Div. of H. K. Porter Co., Inc. Mr. Sawtelle was a sales engineer with Baker Oil Tools, Inc. until the outbreak of the war. He will be located at the H. K. Porter Co. offices in New York.

• **Walter C. Leitch** has been elected vice-president and general manager of Aro Equipment Corp., Bryan, Ohio. Since 1921 Mr. Leitch has been associated with Gilbert & Barker Mfg. Co.

PERSONALS

• **Grier D. Patterson**, member of the law firm of Winston, Strawn & Shaw, has been elected secretary of Foote Bros. Gear & Machine Corp., Chicago, succeeding the late **Arthur W. Coppin**. **Robert B. Moir**, formerly assistant president, has been made vice-president in charge of engineering and product development of the industrial gear division.

• **Frank B. Newbert** has been appointed assistant general purchasing agent for the American Brake Shoe Co., New York. He has been with Brake Shoe since 1934 and has served in various purchasing capacities with the company.

• **Carl P. Simmons** has been appointed service engineer of the Philadelphia territory of Nelson Sales Corp. with his offices in Lansdowne, Pa. Mr. Simmons was formerly service engineer for the Chicago territory.

• **Maurice Stanley**, president of the Fafnir Bearing Co., New Britain, Conn., during the past 21 years, has been elected chairman of the board, and executive vice-president **Stanley M. Cooper** has been named president to succeed him. Mr. Cooper joined the Fafnir organization in 1924 and has held several executive offices.

• **Andrew J. Lacock** has been named New York district manager of sales for Lukens Steel Co. and its divisions, By-Products Steel Co. and Lukenweld, Coatesville, Pa. He will make his headquarters in New York. Mr. Lacock had been associated with General Electric Co. and with Firestone Tire & Rubber Co. **J. J. Reynolds**, who has been New York district manager of sales, will continue to serve as a member of the staff in the New York district sales office.

• **George Morlock**, general foreman of Kaiser Steel's byproducts, benzol and tar plant at Fontana, Calif., has been promoted to superintendent of the company-operated coke plant at Sunnyside, Utah. He joined Kaiser Co., Inc. in 1942.



JOHN C. IRWIN, secretary and
general attorney, Oil Well Supply
Co.

• **John C. Irwin**, an attorney for U. S. Steel Corp. of Delaware, has been named secretary and general attorney for Oil Well Supply Co., U. S. Steel Corp. subsidiary. Mr. Irwin has been a member of U. S. Steel's law department since 1941. For the present he will remain in Pittsburgh, but will move to Dallas in the near future.

• **W. B. Coullie**, vice-president and a director of Harbison-Walker Refractories Co., Pittsburgh, has retired. He has been associated with Harbison-Walker for more than 40 years.

• **William B. Todd** has been elected executive vice-president and a director of Continental Foundry & Machine Co., Pittsburgh. He is resigning as assistant to the president of Aetna Standard Engineering Co. to assume his new duties with Continental.

• **Edwin J. Lewis** has been appointed sales representative for the northern Ohio territory of Keystone Carbon Co. His headquarters are in Cleveland. Mr. Lewis was formerly a sales engineer for the Ohio Ball Bearing Co. **Gerald G. Fellows** has been appointed New England sales representative of Keystone Carbon, with headquarters in Hartford. He was formerly a sales engineer for the Electric Appliance Corp.

(CONTINUED ON PAGE 140)

STAINLESS
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TRADE MARK

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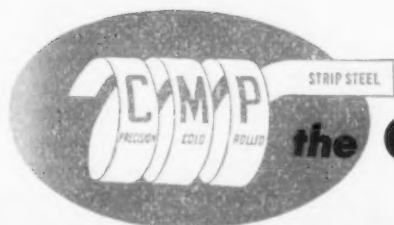
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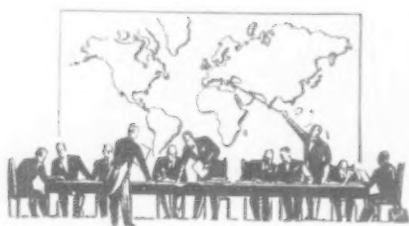
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THE IRON AGE, April 1, 1948—113

European Letter . .

• American Opinion Is For Increasing Military Aid to Chinese Government To Combat Growing Communism . . . Communist Victory in China Would Mean Its Alignment in the Soviet Bloc.



LONDON—The rape of Czechoslovakia has stirred up American politics into a fresh blaze of anti-Communist resolution and activity which is by no means confined to Europe. In combination with recent news from the Far East, militant Communism in Europe has brought a large section of American opinion round to the idea of giving military aid to the Chinese government in its civil war. A few weeks ago the auspices for such proposals were not favorable and the Administration's program called for an appropriation for China of only \$570 million for relief and recovery. But on Mar. 2, ex-Ambassador Bullitt, addressing the House Foreign Affairs Committee, denounced the State Dept. for "blindness and apathy" towards China and demanded \$100 million for military supplies.

On the next day even heavier guns were brought to bear; a cable from General MacArthur's castle in Japan was read to the legislators. In it the General told them that "a free, independent, peaceful and friendly China" was essential to "the peace of the world and the position of the United States," and that mere economic aid could not bring it rehabilitation as long as the military problem remained unsolved. The Committee has now tacked aid for China on to ERP

in its Bill for the House of Representatives.

SINCE the period immediately after the war, when American transport was used to enable the Chinese government troops to move up to North China and forestall the Communists in taking over from the Japanese, there has been a natural reluctance in the United States to intervene in the Chinese civil war. Intervention in a foreign country must be for someone as well as against someone, and few Americans have recently been able to see in China any authority to which the support of American power could be given with a clear conscience.

The correct moral position for Americans, in their emergence from isolationism, is to sustain a democracy against domestic dictatorship or foreign aggression. But in China no real political democracy exists to be endangered; the struggle has been hitherto between two brands of revolutionary "tutelage," and the elections recently held in Kuomintang China to establish the democratic legitimacy of the present regime were not, even on the most generous interpretation, very convincing.

In the absence of any fair means of measuring relative popular support for the rival parties in China, Gen. Chiang Kai-shek's government might still have gained—or rather retained—general moral support in the United States, if it had shown

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itself, since the defeat of Japan, an active promoter of social and administrative reform. But shocking manifestations of inefficiency and corruption, particularly the postwar reign of carpet-baggers in Shanghai and Formosa and the malversations of UNRRA goods by high officials, have alienated many American observers who cannot be suspected of inclination towards Communism. Indeed, they have been disposed to think well of any deluge which might cleanse the Augean stables.

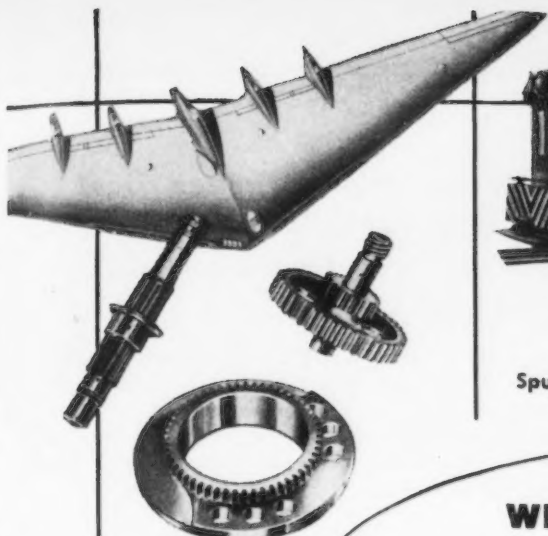
The Communists by contrast

have won good reports for the honesty of their administration and the personal austerity of their leaders—for the Chinese Communists, who need to bid for the genuine support of the masses, are still in the stage of apostolic poverty. Moreover, their short-term program of agrarian reform and toleration for private enterprise in industry has seemed harmless enough to foreign business men and liberal politicians, who have even been converted in some cases to the belief that Chinese Communists are a distinct species, distinguished from Communists of other lands by the difference between a grass snake and an adder.

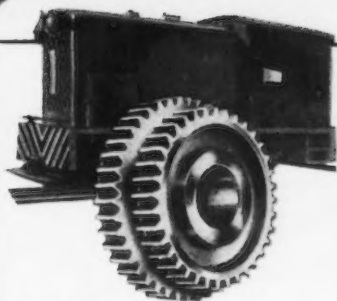
Were it not for the question of China's foreign policy, there can be no doubt that American tactics would be to let events in China take their course and recognize whatever power emerged from the struggle.

IT is not true, as is sometimes asserted, that the Chinese Communists were anxious to cooperate with the United States and were only driven to take up an anti-American attitude because of American help for the Kuomintang. They were indeed eager to share in the supply of American lend-lease to China, and were quick to encourage wishful thinking among American officers and journalists who visited them. But the full orthodoxy of their party line was demonstrated between 1939 and 1941, when they faithfully reproduced Soviet propaganda of the Molotov - Ribbentrop honeymoon.

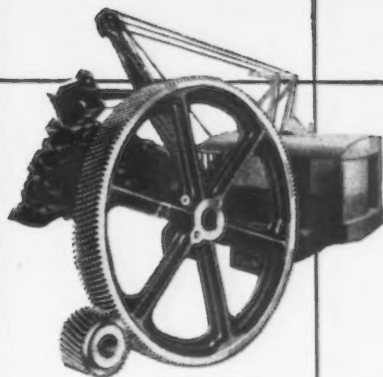
There cannot be any reasonable doubt that Communist victory in China would mean its alignment in the Soviet bloc, with the same campaign against all Western influences, political, cultural or economic, that has been going on in the countries of the Russian zone in Europe. From recognition of this probability, American official circles have been slowly and reluctantly drawing the inference that active measures must be taken to prevent the overthrow of what remains internationally the legal government of China.



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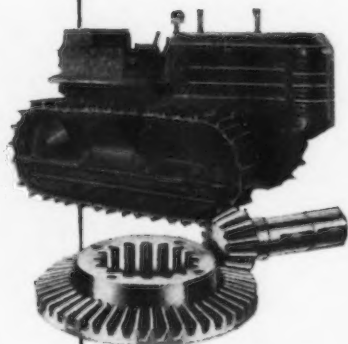


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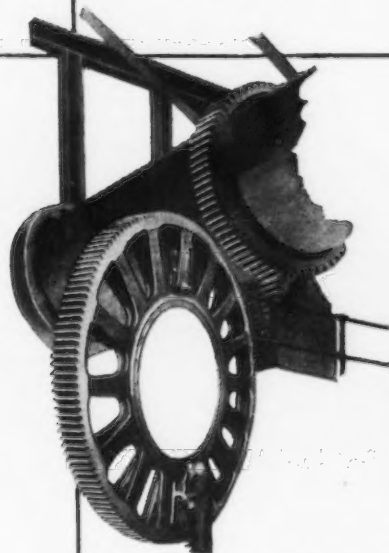
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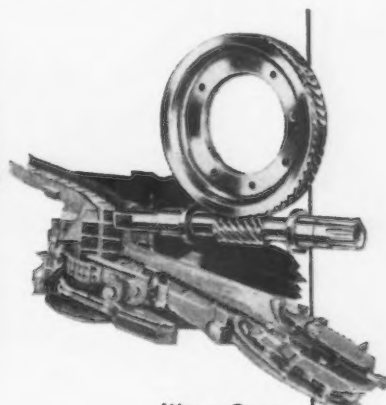
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Industrial News Summary...

- **Coal Strike Cripples Steel**
- **Steel Controls Seen Coming**
- **Consumers Face Quota Cuts**

THE coal strike has seriously crippled the steel industry. There is a chance that the industry will not better last year's steel production of 85 million tons. It had been hoped that close to 90 million tons would be produced this year.

Worse than the further shortage of steel and less pig iron at a time when it is urgently needed is the final blow of all—the steel industry today faces rigid government allocation of steel similar to wartime controls. The loss of steel already encountered, combined with additional losses which will accrue before the coal fiasco is ended, makes that almost certain.

The slow motion tactics of the government in realizing the extreme seriousness of the coal shutdown will be apparent late this week when many steel companies will be forced to drop their output with a bang. The inability of the coal operators, who are supposed to have a good working knowledge of John L. Lewis' actions, to keep up with the mine union head does not speak well for them. He just outsmarted them as he has done for the past several years.

The effects of the coal strike will be felt long after some sort of a settlement is made. They will show up in shortages next winter because of the long upward fight to regain full output of pig iron which is a prime necessity if steel capacity is to be completely utilized.

What the coal strike will do to steel consumers in the third quarter of this year is only now sinking into the minds of those users who had laid ambitious plans to turn their backlogs into finished manufactured products. Now comes the need for Marshall Plan requirements, the probability of a record peacetime defense program and the large scale drum-beating by the oil industry for much needed steel.

IN the face of all this government officials in high places are assuming that rigid controls over steel output and distribution are necessary. They figured that ERP could be handled in normal peacetime fashion. But the President's message on defense needs and the coal strike changed all that thinking.

The view among government bigwigs is that controls should come quickly and smoothly if they are needed. The country should not be treated to a spectacle of shoving and pushing in a piecemeal fashion with its resultant confusion and misdirection.

Before a good control program was put into effect during the last war the meandering, backstepping, confusion and frustration which preceded the Controlled Materials Plan were something no living person hopes to become mired in again. But steel officials who took part in the last controlled distribution program are wagging their heads.

They hate regimentation and allocations and will fight them as long as possible with voluntary cooperation on the current allocation plan. But some top steel heads privately expect strict government controls before the year is out.

Right now the freight car program is the only one under the government voluntary allocation program. However, the petroleum industry is asking for heavy tonnages. The strategic nature of its plea makes certain that the chunk of steel to go to oil will be heavy. To superimpose the ERP steel needs on top of the voluntary allocation of steel to oil and freight car builders will make other steel customers suffer a severe case of "anxiety" lest they miss out on their needs.

Even now various defense agencies are inquiring for large quantities of steel products. These orders will mean less plates, pipe and bars for domestic steel fabricators. And aircraft makers have stepped in with inquiries which will bring to a new tautness the alloy steel bar outlook. Deliveries on this product were 3 to 4 weeks, early this year—today promises run from 3 to 4 months.

THE result of current defense inquiries and probable future order volume has lead several large steel companies to warn their customers that third quarter quotas will be cut. Some steel firms in the past few weeks have been asked to provide price and shipment data on shell steel.

The major reason why steel officials privately feel that rigid and overall controls over steel are on the way is because of the experience in the last war with inflated orders and carelessly drawn specifications. At one time in the process the old priority system practically fell of its own weight. What some government officials do not see is the delicate balance between good steel distribution and maldistribution.

Total requirements for armaments, ERP and strategic domestic needs may not be too large a percentage of total steel output. But it is certain that the requirements for specific steel items such as pipe and plates can so throw the regular output of other items out of balance that it is almost inconceivable—to those who have not been through the mill.

Gray market activity in the upper realms is still marking time. If strict government controls come the gray market will turn black. But since the present high premium market has been supported by excess steel sold by steel users, the latter may not have as much to peddle if their supplies are closely controlled. This week gray market sales are still on a spot basis. No long commitments are being made. In some areas the prices have dropped from 16¢ a lb to as low as 11¢ a lb—a figure not comparable with large sales at much higher prices some months ago. The coal strike will force more users to use higher than mill price steel—but the bloom is off the gray market.

The scrap market is dull this week. Heavy melting grades have not changed in price. Secondary grades are stronger and there is still no sign of a wide open break in prices.

Steel output this week is down to 89 pct, a decline of 5½ points from last week's revised rate of 94.5 pct.

• **SPARROWS POINT PRODUCTION**—Eastern cold-rolled sheet consumers have assumed that when all facilities at Bethlehem's mill went into production, their sheet supply problems would be over. Now it is reliably reported that the new facilities will be used mostly for the production of hot-rolled sheets and tinplate. This will be good news for hot-rolled sheet consumers in the eastern market who have suffered badly from the withdrawal of western producers from the eastern hot-rolled market largely because of the Sparrows Point basing point. Although the new mill has already been put into operation, sheet and strip production will not be significantly increased until the new steelmaking facilities are completed.

• **REARMAMENT TALK**—The air is thick with rearmament rumors but so far there has been very little positive action. Inquiries by aircraft companies are up sharply and some steel firms have recently received shell steel inquiries. Actual substantial orders await a Congressional boost in appropriations.

• **IRON ORE HIKE**—Cleveland Cliffs Iron Co. announced its 1948 season prices on iron ore March 27. This firm has sold considerable tonnage for delivery this year at prices based on \$6.20 per gross ton delivered at lower lake ports for Mesabi Range non-bessemer ore, 51.50 pct iron natural content. These prices are 65¢ per gross ton higher than the 1947 season quotations. The new price is 25.3 pct above the 1939 quotation. Other ore firms are expected to meet the new price.

• **SPIEGEL PRICE INCREASE**—An increase of \$5 a ton in the price of spiegeleisen at Palmerton, Pa. has been announced by the New Jersey Zinc Co. effective Mar. 22. The increased price is required by the loss of the customary source of byproduct coke and the company's current dependence on inferior grades of coke.

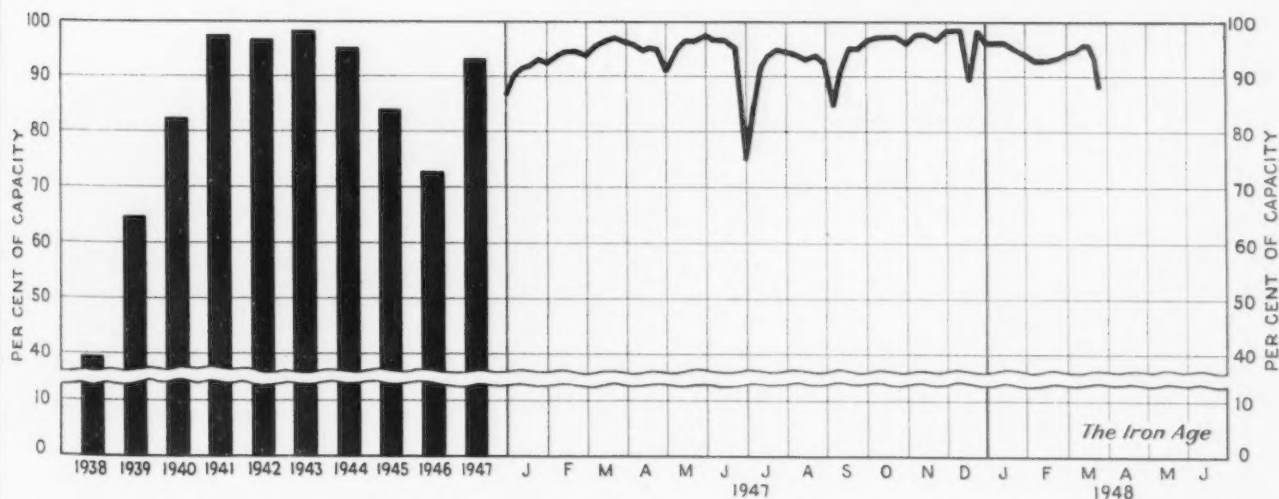
• **INDIA MANGANESE TAX**—An export tax of 20 rupees per ton on manganese ore, \$6.06 per ton at the current rate of exchange, has been imposed by the Indian Government effective Mar. 1. The tax has not yet been passed by the legislature and it is understood that the U.S. and Britain are expected to apply pressure to prevent its passage. The Indian tax is applicable to manganese ore of any grade and thereby penalizes the lower grade ores. The increase in the cost of Indian manganese would require an estimated increase of some \$15 a ton for ferromanganese made from it. There is some talk of a boycott of Indian ore if the tax is passed.

• **WIND TUNNEL**—A new wind tunnel to produce an air speed of 1865 mph is to be constructed for the use of the aviation section of the Royal University of Technology in Stockholm. It will be Sweden's second big wind tunnel, the Swedish Aviation Technical Research Laboratory at Ulvsunda, near Bromma Airport, having one of an equal capacity. The Swedish Government is paying great attention to aviation research, and two new chairs in this faculty may be created in Stockholm.

• **WILL MAKE PIPE**—Worth Steel Co., Claymont, Del. has plans to enter the large diameter pipe field when the necessary equipment can be delivered. This may be some time off. It is understood that pipe diameters may range from 20 in. to 36 in. Present plans call for slitting plate into desired widths and butt welding after forming.

• **COST FIGURES**—Jones & Laughlin's president, Ben Moreell, has given out a figure not often seen these days—steelmaking cost increase. Costs other than wages have risen \$3 a ton since Oct. 1, 1947, he said. According to IRON AGE analysis, steel price boosts put into effect since that time amount to an average of just a little over \$3 a ton on an annual basis.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 23	97.0	96.0	93.0	90.0	93.0	84.0*	99.0	90.0*	102.0	100.0	100.0	77.5	98.0	94.5*
March 30	95.0	94.0	84.5	87.5	95.5	84.0	97.0	76.0	102.0	86.5	95.0	77.5	98.0	89.0**

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JONES & LAUGHLIN STEEL CORPORATION

Government Steel Allocation Seen As a Distinct Possibility

Pittsburgh

• • • Long before the year is out Washington will be allocating steel. This is the private opinion of several top flight steel executives who dread the very thought of government control and who will try to prevent it by voluntary cooperation as long as they can. But privately they admit that a stepped up armament plan on top of the European Recovery Program, all superimposed on voluntary allocations for carbiding, petroleum, probably farm implements and possibly veterans' hospitals will not work without government direction.

Government agencies are already hammering on the doors of steel companies for plates, sheets, pipe and nails in quantity. Some steel producers are suggesting these requirements be processed through the voluntary steel allocations set-up in Washington. Others are quietly booking their relative proportion of the orders; if, for instance, the Navy wants 15,000 tons of plates and their plate capacity is 10 pct of the national total they book 1500 tons. Some will take the entire order if it isn't too staggering.

There isn't a single important steel company unwilling to cooperate fully on any armament or essential industry program. But as orders mount there is a growing feeling that they will have to be screened—that someone high up will have to assign priorities. Too many steel executives recall the carelessly drawn and inflated orders placed by most government agencies at the beginning of World War II.

Everyone—a few government people excepted—agrees that voluntary freight car steel allocation is working very well. But contrasted with what the petroleum industry asks for alone it is small potatoes. Most steel sources believe the oil industry's request will be cut down before the program is in final shape; even so the prospect of this steel and other requests to come is substantial. Even without an increase in armaments, ERP coupled with the projected stepup in the voluntary allocations program

Present Program Plus ERP May Force It; Arms Boost Would Be Clincher

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

makes government steel allocation a distinct possibility in the minds of

See p. 124 for Washington angle on defense program.

some steel officials.

In the steel sales offices the voluntary allocation comes off the top of the schedule book. Petroleum needs, with heavy emphasis on

plate, pipe and tubing, will get that treatment like carbiding steel. The balance is available for other customers. But ERP tonnage is so much heavier that it may have to be put on a more official basis to insure priority and quick shipment.

These needs might be worked out on a voluntary basis but executives of some of the larger steel companies are beginning to doubt that they can. That's why they predict government allocation. Some would prefer it—for three reasons (1) Orders would be screened to weed out the unessential; (2) all steel producers would get equal treatment; and (3) customers whose quotas are cut would know why—the pressure would be off, the individual producers.

As an example, plate demand now far exceeds production capac-

Diplomacy's Little Helper



ity. If the Navy wants plates and the Atomic Energy Commission needs them and the Air Force calls for armor plate and the oil and gas people have to have the plate it appears that someone in authority will have to say who gets what first.

Often overlooked in Washington is the fact that though total steel tonnage requirements may be relatively small they can mount in certain products to the jamming point. Openhearth alloy bar supply is a case in point. These bars, quotable in January for 3 to 4 weeks delivery, are now running 3 to 4 months. And despite the national picture of electric furnaces operating at only 73.7 pct of capacity—for bars, plates, sheets and semifinished items. If they are wanted in a hurry, Detroit, the No. 1 peacetime alloy customer, will apparently

have to take a cut. This would bite into automobile production and cause such loud screams in Detroit that no single alloy producer would care to be the first to slash auto steel quotas. They'd prefer a government finger man.

Will Study Gray Market

Washington

• • • A House investigating committee is collecting evidence of gray market operations in aluminum. Rep. Macy, R., N. Y., committee chairman, says he wants to know why a major producer of steel and aluminum was selling aircraft aluminum at 31¢ per lb when the market price was in the neighborhood of 12¢ per lb at the time.

New Cupola Installed

Detroit

• • • A cupola as high as a ten-story building has just been completed at the Geneva, N. Y. plant of the United States Radiator Corp.

Rising to a height of 115 ft from base to the top of the stack, the new cupola was installed by the Modern Equipment Co., Port Washington, Wis.

The new cupola equipped with a spark arrester to prevent sparks from flying over surrounding buildings. It also has a fly ash remover to collect solid particles from gas coming out the stack. A skip hoist is used for charging.

The Geneva plant is one of three U. S. Radiator Corp. plants manufacturing cast iron boilers.

AMERICAN IRON AND STEEL INSTITUTE										
SHIPMENTS OF STEEL PRODUCTS										
ALL GRADES INCLUDING ALLOY AND STAINLESS										
(Net Tons)										
JANUARY - 1948										
Month										
Steel Products	Number of companies	Items	Current Month		To Date This Year		Whole Year 1947			
			Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale)	Per cent of Total Shipments	Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale)	Per cent of Total Shipments	Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale)	Per cent of Total Shipments	Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale)	Per cent of Total Shipments
			(Net Tons)		(Net Tons)		(Net Tons)		(Net Tons)	
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	42	1	295,583	5.5	258,598		3,089,121	4.9	2,273,970	
Structural shapes (heavy)	15	2	334,476	6.2	2,643		4,436,129	7.0	2,640	
Steel piling	4	3	23,243	0.4	6		324,224	0.5	23	
Plates (sheared and universal)	29	4	529,897	9.8	34,263		6,345,216	10.0	219,227	
Skelp	3	5	12,507	0.2	45,458		160,989	0.3	384,004	
Rails—Standard (over 60 lbs.)	4	6	172,285	3.2	1,796		2,207,146	3.5	991	
—All other	5	7	28,613	0.5	169		211,900	0.3	329	
Joint bars	7	8	10,723	0.2	1,931		173,923	0.3	15,198	
Tie plates	7	9	40,372	0.7	-		504,779	0.8	4,437	
Track spikes	7	10	10,545	0.2	-		163,746	0.3	146	
Hot Rolled Bars—Carbon	31	11	520,965	9.6	59,078		6,242,416	9.9	745,770	
—Reinforcing—New billet	14	12	105,840	2.0	590		1,277,075	2.0	9,775	
—Reinforcing—Rerolled	11	13	9,976	0.2	-		175,833	0.3	-	
—Alloy	23	14	158,238	2.9	15,601		1,741,432	2.7	212,382	
—TOTAL	42	15	722,019	14.7	72,269		9,436,756	14.9	967,927	
Cold Finished Bars—Carbon	27	16	115,989	2.1	266		1,426,701	2.3	9,249	
—Alloy	25	17	17,099	0.3	307		218,802	0.3	2,601	
—TOTAL	32	18	133,088	2.4	573		1,645,503	2.6	11,850	
Tool steel bars	18	19	6,642	0.1	91		87,279	0.1	1,670	
Pipe & Tubes—Butt weld	16	20	158,799	2.9	2,112		1,892,691	3.0	78,080	
—Lap weld	8	21	30,885	0.6	-		389,762	0.6	875	
—Electric weld	12	22	133,197	2.5	320		1,254,325	2.0	4,274	
—Seamless	16	23	218,068	4.0	12,978		2,581,106	4.1	157,208	
Wire rods	19	24	63,247	1.2	28,342		667,282	1.1	331,192	
Wire—Drawn	39	25	228,982	4.2	15,400		2,590,963	4.1	181,785	
—Nails and staples	17	26	68,954	1.3	1,373		799,436	1.3	8,481	
—Barbed and twisted	14	27	22,578	0.4	2		256,991	0.4	128	
—Woven wire fence	12	28	34,645	0.6	182		407,295	0.6	3,616	
—Bale ties	11	29	10,169	0.2	-		119,917	0.2	-	
Black Plate—Ordinary	9	30	62,623	1.2	-		801,745	1.3	2,033	
—Chemically treated	1	31	485	-	-		19,252	-	-	
Tin and Terne Plate—Hot dipped	8	32	138,787	2.6	15		2,093,149	3.3	228	
—Electrolytic	9	33	128,528	2.4	24		1,617,659	2.6	529	
Sheets—Hot rolled	31	34	683,413	12.6	54,144		7,891,798	12.5	578,426	
—Cold rolled	16	35	571,583	10.6	2,484		7,244,278	8.7	28,498	
—Galvanized	16	36	129,145	2.4	116		1,609,881	2.5	889	
Strip—Hot rolled	20	37	145,771	2.7	30,143		1,740,085	2.7	3,865	
—Cold rolled	33	38	146,318	2.7	2,591		1,613,005	2.6	28,030	
Wheels (car, rolled steel)	5	39	26,126	0.5	193		356,873	0.6	2	
Axles	5	40	15,435	0.3	59		185,019	0.3	53	
All other	-	41	-	-	-		-	-	-	
TOTAL STEEL PRODUCTS	140	42	5,410,438	100.0	521,235		63,179,523	100.0	5,592,392	

During 1946 the companies included above represented 99.5% of the total output of finished rolled steel products as reported to the American Iron and Steel Institute.

Special Report . . .

Saga of Iron at Daingerfield Furnace Packs Drama Galore

Daingerfield, Texas

• • • Blast Furnace experts as late as last year declared nobody could make iron at Daingerfield. A 35 year old Pittsburgher, William R. Bond, former blast furnace man of Crucible Steel Co. thought they were wrong. This graduate engineer from the University of Pittsburgh went with Lone Star Steel Co. supposedly because of a chance to pioneer, but more correctly for the simple reason that everybody said it couldn't be done. Bill Bond did it—the hard way.

After lining up some trained men, he left behind an attractive offer in an established plant to tackle the unknown iron making equation at Daingerfield. The furnace had never run. Scaffolding left by the bricklayers who lined the stack lay on the hearth. Scores of valves, miles of piping, and a lot of complicated equipment had not been tested.

At the last minute the trained men previously lined up to follow Bond to Texas refused to leave the security of their old jobs. Bond scoured the country and found the only other experienced man he could interest—running a restaurant in Birmingham. John Brumbrugh had spent his normal working span running blast furnaces for Republic Steel Co. and other companies in the South. He had retired from the steel business several years before, but when Bond came to his restaurant and spilled out the proposition Brumbrugh couldn't say no.

For weeks prior to blowing in, Bond rehearsed the crew on what they must do to run a blast furnace. These former farmhands and oil field workers played blast furnace, going through all the motions, making believe the furnace was in operation.

After intense practice they rehearsed their play, studied their task, until Bond was certain they knew their respective assignments—which lever to pull, which button controlled what and exactly when to pull or push. None of this help

Two Oldtimers and Green Crew Prove Experts Wrong by Making Good Iron

By D. I. BROWN
Chicago Regional Editor

had ever seen a blast furnace before but Bond showed them, he showed them every single inch of her, with gestures.

The old Elliott trubo-blower which was selected to supply the air blast to the furnace allegedly had a capacity of 30,000 cu ft of air per min. But no one knew for sure as it had never been measured.

Few spare parts for the furnace and its auxilliary equipment were available. If something big broke, it was curtains, but Lone Star had to get running so D-day was set.

On October 25, 1947, after warming for 2 weeks, the FLOSSIE BELLE, equivalent in size and equipment to the largest blast furnaces in the world was lit. Tons of untried limonite ore were in the stack, the old Elliott blower of questionable capacity and endurance was revved up. The pumps started pulsing thousands of gallons of water through the cooling systems. Seven apple green, somewhat scared but well rehearsed, actors, plus Bond and Brumbrugh, stood ready for their first production—iron from an untested furnace charge, with an untried crew out in the middle of a vast new ore field which everybody said was a sad mistake.

The next day the furnace was tapped. It was iron! A cockeyed analysis, but iron. For 2 weeks Bond lived at the furnace, the help improved. Once when the iron notch blew up, the crew set out full speed over the casting floor for the hills, but they came back. High moisture content of the beneficiated ore gave trouble. Coke ratio was high, slag volume was

high, and at times Bond got pretty low.

Once the down-comer handling flue dust clogged, threatening to stop the whole works, or blow it up. At times the two experts operated the furnace with the rest of the crew watching from a safe distance behind building columns.

Today Flossie Belle is a smooth running stack. None of the "greenhorns" have left. They are full-fledged iron men. Production of the country's scarcest large tonnage metal has been increased. Not much, but nevertheless increased.

Wrinkles still have to be smoothed out. Higher production is ahead. A spanking new trubo-blower is being installed. Costs are beginning to be cut. Bond is getting 8-hours sleep a night. His wife and three children even recognize him again and Lone Star is getting iron, which, according to the boys who know, "is damn good iron, too."

Allis-Chambers Profit

Milwaukee

• • • The Allis-Chalmers Mfg. Co. reported net profit of \$5,422,308 for the year ended Dec. 31, 1947, compared with a 1946 profit of \$144,487.

The net sales billed for 1947 totaled \$211,949,890 as compared with \$93,840,030 for 1946, when strikes were in progress at seven of the firm's eight plants. The 1947 billing represents a record peacetime sales volume.

WAA Offers Furnaces

Cleveland

• • • Cleveland Regional office, War Assets Administration, is asking for sealed bids on \$385,000 worth of surplus industrial furnaces, including oven type, sintering, pit type, Lindberg, aluminum melting, box type, rotary, and salt bath furnaces; quench presses; induction heating units; melting pots; and crucibles.

Industrial Briefs . . .

• **INSTALLS ROLLING MILL**—The American Cladmetals Co. has announced that installation of its new rolling mill at Carnegie, Pa., has started.

• **METALLURGISTS MEET**—The American Institute of Mining & Metallurgical Engineers, Institute of Metals Div., will hold its second annual New England regional conference on Apr. 16 and 17 at the Hotel Taft, New Haven, Conn.

• **LINDE EXPANDING**—Linde Air Products Co. has announced that plans are being completed for the construction of an oxygen filling station and acetylene-producing plant at Billings, Montana.

• **MERGER**—The National Screw & Mfg. Co., Cleveland, has acquired the Hodel Chain Co. Hodel operations will continue under the same management.

• **BUILDS NEW WAREHOUSE**—The Hanover Steel Corp., subsidiary of the Solar Steel Corp. of Ohio, has awarded contracts for the construction of its new warehouse at Lehigh Ave. in Union Township, N. J.

• **APPOINTMENTS**—Robert A. Lubker has been named assistant chairman of metals research activities at Armour Research Foundation, Chicago, and Walter C. Troy as supervisor of heat treating research.

• **FACTORY OFFICE**—Hanna Engineering Works, Chicago manufacturers of pneumatic and hydraulic cylinders, valves and riveters, has opened a direct factory office in Detroit at 1609 Industrial Bank Bldg.

• **SELLS ORE FACILITIES**—The surplus government-owned iron ore concentrating facilities at Iron Mountain, Mo., have been sold to the Ozark Ore Co. The plant will continue to produce iron ore concentrates and tailings.

• **FORMS CORPORATION**—Petroleum Engineering Corp. is the newly formed organization which will assume all work formerly handled by Petroleum Engineering Industries, Inc., Chicago.

• **ADDS NEW MEMBERS**—Robert Rasmussen, plant controller, Doehler-Jarvis Corp., Batavia, N. Y., and Harold H. Schacht, treasurer, Central Foundry Co., New York, have been elected to membership in the Controllers Institute of America.

• **NEW DIVISION**—Morse Chain Co. division of Borg-Warner Corp., and the Formsprag Co. of Ferndale, Mich., have formed the Morse-Formsprag sales department at 7601 Central Ave., Detroit. Morse-Formsprag has developed a completely new line of over-running clutches for industrial use.

• **COASTAL OUTLET**—Liquid Carbonic Corp., which recently completed the construction of a large plant in Chicago, has announced that it has acquired the Stuart Oxygen Co., Pacific coast producer of oxy-acetylene gas.

• **PURCHASE**—The Morden Frog & Crossing Works, Chicago Heights, Ill., manufacturers of railroad track material, has been purchased by the American Brake Shoe Co., and will be operated as a unit of the Ramapo Ajax Div.

• **CANADIAN STORE**—Western Auto Supply Co., Kansas City, will open a retail store at 131 King St., West, Hamilton, Ontario, on Apr. 15. The new building will also house its Canadian buying offices.

• **NEW SALES POLICY**—Southern States Iron Roofing Co., Savannah, has gone out of the mail order and retail business. All their products will be sold through dealers only.

• **EXPORT DISTRIBUTOR**—The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has appointed Sipanam, Inc., 233 Broadway, New York, as export distributors for their complete line with the exception of jaw crushers in the countries of Canada and Mexico.

Warehouse Prices Vary On Cold-Rolled Strip

Chicago

• • • Warehouse prices on cold-rolled strip in Chicago at the moment show a well scattered shotgun pattern. Prices vary from \$5.45 to \$6.65 per 100 lb depending on the source. U. S. Steel Supply, J and L, and Ryerson publish a \$5.45 price but they have available very little strip to sell at this figure. The only other large supplier who has complete facilities is Central Steel and Wire Co. and so far they are adhering to the \$5.45 price. Smaller warehouses who appear to be handling the going tonnage on this item have not sold on the cheap base since last July, and on Mar. 5 five of them increased the price to \$6.65 on base quantities delivered in the Metropolitan area.

One of the reasons for the variable price is the fact that cold-rolled strip in most of the warehouses is now shipped in here from the East. Many of the warehouses must buy the coils F.O.B. Cleveland and generally they receive odd quantities of cat and dog widths on which the processing costs are very high. The warehouses who on Mar. 5 again increased the price in Chicago are as follows: Korhumell, Heffron and Priess, Corey Steel Co., Standard Steel and Wire Co., General Steel Warehouse Co. and Lapham, Hickey Co. Other warehouses such as Steel Sales Corp., Century Steel, and the Caine Steel Co., are also either on this new price or the old price of \$6.25 per 100 lb which was established about Jan. 1.

Inasmuch as this group of small steel warehouses are actually shipping as much or more cold-rolled strip out of Chicago as are the larger warehouses, THE IRON AGE cold-rolled strip warehouse price will be opened up to show the full actual representative price range.

Alcoa Transfers Its Foundry Operations

Bridgeport, Conn.

• • • Virtual completion of the transfer of Alcoa's sand and permanent mold casting operations from Fairfield, Conn. to Bridgeport, has been announced by C. H. DeLamater, works manager.

Bethlehem Prepares to Reenter Stainless Bar and Billet Market

Bethlehem, Pa.

• • • Bethlehem Steel Co. is about to reenter the stainless steel bar and billet market after having been out of the market during the war as the result of the heavy demand for alloy steel tonnage.

Open capacity for tool steels and stainless steels at the Bethlehem plant grew out of the transfer of a large part of Bethlehem's alloy steel production to its Lackawanna plant, from which water transportation to Detroit and other mid-western consuming centers offer marketing advantages. The company's electric furnace capacity is concentrated at Bethlehem, where facilities for the production of up to 50 tons of electric furnace steel per day are located.

At Bethlehem, rolling mill facilities are adequate to permit the production of stainless bars and billets in sizes equivalent to those produced by any merchant mills. Forging hammers and presses are available in the greatest range of sizes, with hammers up to 12,000 lb and presses up to 14,000 ton. Fifteen inch billets can be produced from press forgings.

Complete heat treating facilities are available for stainless steel production, with new high temperature furnaces and automatic quenching facilities. The hardenable grades of stainless can be handled in the conventional equipment formerly used for the heat treatment of alloy steel. The Hooker Electrochemical Co. process is used for pickling stainless.

The cold drawing facilities formerly used for alloy steels are now available for drawing stainless steels. Ample facilities are available for centerless grinding and polishing.

Melting equipment at Bethlehem, and hot and cold finishing facilities provide capacity for the largest scale production of stainless steels. There are two nominal 50-ton arc furnaces that have produced up to 70 tons of metal per 8-hr heat; one 25-ton and one 7-ton furnace. These furnaces, representing in part war-built capacity for aircraft forgings and bar stock, have been equipped with Amplidyne automatic control equipment to minimize carbon

Delayed Deliveries of Some Equipment Have Slowed Plans to Reenter

By JOHN ANTHONY
Eastern Regional Editor

pick up from the electrodes and simplify the production of the desirable low carbon stainless steels.

Rolling mill equipment now available to stainless steel includes a 35 in. blooming mill, a 22 in. billet mill, and 10 in., 9 in. and 8 in. mills.

Although the company expected to be in the stainless market

months ago, delayed deliveries of equipment and heavy foreign orders for tool steels have served to delay full scale entry into the field. It may be another month or so before the company enters the market aggressively to seek new business. Some observers believe that the advertising program for stainless, which began in November, was somewhat premature.

Bethlehem has repeatedly surveyed the stainless steel market with a view toward entering it with a complete line of products. So far the company's interest in the market has been limited to bars and billets, but the industry's shrewdest observers believe that Bethlehem will not choose to remain out of this profitable market for many more years.

50 YEARS AGO

THE IRON AGE, March 31, 1898

• "While the war scare has already done considerable harm, it has had one very important effect by bringing conspicuously before the country the fact that our means of national defense are out of all proportion to the enormous interests endangered in times of conflict. It is pitiable to be forced to admit that we are able only to resist a second class power. It is a disgrace that we must send representatives scurrying about from yard to yard abroad to secure ships enough to put us on a par with Spain, one of the poorest European powers."

• "In Merriton, Ontario, a justice has rendered a decision that a man who worked on Sunday in the St. Catharines Carbide Works violated the Canadian Lord's Day Act. A nominal fine was imposed but the case will be appealed."

• "The long stride which cast steel has taken during the past

five years is strikingly impressive. So rapid has been the displacement of other materials that apparently there is only the question of cost which prevents its almost universal adoption in machine work, except where plate is necessary. The general character of openhearth cast steel is now almost perfect as to uniformity, toughness, malleability and tenacity, and the problem of brittleness has finally been overcome."

• "The Post Office Department is so well satisfied with the recent experiments with rural free delivery that arrangements are being made for material extension of the system."

• "Chicago's City Council has passed an anti-sky-scraper ordinance which provides that buildings shall not be more than nine stories high with a total height limit of 130 ft."

Believe Rearmament Drive May Bring Back Government Controls

Washington

• • • High administration sources are seriously considering whether the most important implication of the current rearmament drive would not be an early resumption of production, price and wage controls. THE IRON AGE learned this week.

While the idea is still in the thinking stage, opinions of industry, labor and agriculture are already being solicited.

Primary reason for this line of thought is the feeling that the preparedness program, regardless of its eventual size, has made it necessary to consider whether such a program should be submitted to Congress.

There was little doubt in the minds of administration leaders that the European Recovery Program could be taken in stride with no more control than the voluntary allocations procedures now being worked out. The President's call for rearmament was the straw that broke the camel's back. Adding to

Administration Officials Now Considering Price, Wage, Production Controls

By GENE HARDY
Washington Editor

the anxiety are the current capers of John L. Lewis.

The inflationary characteristics of an arms program loaded onto

See p. 119 for field report on defense angle.

the present highlevel economy might create forces too dangerous to leave uncontrolled, according to these officials.

"We must face squarely what we have to do, and then move ahead along these lines, rather than be pushed into it as occurred during the war period so that we can do this job with the greatest efficiency and least hardship," is the way one

administration source put the problem to THE IRON AGE.

Since the country is not many years removed from the comprehensive controls of World War II it is felt that an overall system of controls could be instituted rather quickly.

One of the major points of difference surrounding discussions of this problem in the nation's capital is the determination of whether it will be feasible to attempt to institute control measure at one fell swoop or attack the problem in an expedient, piecemeal fashion, as was done during World War II.

The piecemeal approach, even with the existence of a master plan, is felt to be undesirable in some quarters because as controls are being improved in certain segments of the economy inflationary pressures would be creating serious bulges in other segments.

While the patriotic motives of business and labor are not disregarded it is still felt that with a continuing high level demand for goods of all types and additional liquid funds in the hands of consumers serious pressures would be built up without proper control measures. Using steel as an example, it is pointed out that even an additional 1 million tons of arms piled on top of ERP, and the loss of production likely to result from the coal walkout, would undoubtedly give the already sagging gray market a substantial shot in the arm.

Any return to controls on a war-time scale is not likely to hit the consumer as hard as was the case during World War II, or, at least not as quickly as would be the case in regard to heavy industry. However, this is entirely dependent on the size of the military establishments the country will be called upon to support.

Studies are already under way to determine what effect armament programs of various sizes will have on the economy. Results of these studies should answer a lot of question raised by President Truman's recent message to Congress.

Coming Events

- Apr. 5-8 National Assn. of Corrosion Engineers, conference and exhibition, St. Louis.
- Apr. 5-8 Southern Machinery and Metals Exposition, Atlanta.
- Apr. 7-9 American Society of Civil Engineers, meeting, Pittsburgh.
- Apr. 8-9 National Machine Tool Builders Assn., meeting, Chicago.
- Apr. 12-14 Openhearth Steel Committee and Coke Oven, Blast Furnace and Raw Materials Committee, AIME, annual conference, Pittsburgh.
- Apr. 15-16 Metal Powder Assn., annual meeting and exhibit, Chicago.
- Apr. 15-16 Zinc Institute, annual meeting, St. Louis.
- Apr. 19 Wire Reinforcement Institute, annual meeting, Edgewater Park, Miss.
- Apr. 19-21 American Society of Lubrication Engineers, convention and exhibition, Buffalo.
- Apr. 19-23 American Chemical Society, national meeting, Chicago.
- Apr. 20 Steel Joist Institute, annual meeting, Edgewater Park, Miss.
- Apr. 21 American Iron & Steel Institute Committee on Researches in Reinforced Concrete, annual meeting, Edgewater Park, Miss.
- Apr. 22-23 Westinghouse Electric Corp., Machine Tool Forum, Buffalo.
- Apr. 22-24 Concrete Reinforcing Steel Institute, annual meeting, Edgewater Park, Miss.
- Apr. 26-28 American Supply & Machinery Manufacturers Assn., National Supply & Machinery Distributors Assn., Southern Supply & Machinery Distributors Assn., Triple Mill Supply convention, Atlantic City.
- May 3-7 American Foundrymen's Assn., convention and show, Philadelphia.
- May 11-12 American Steel Warehouse Assn., annual meeting, Chicago.

Weekly Gallup Polls . . .

French and Italians Support Forces Opposing Communism

Princeton, N. J.

• • • With the entire world anxiously watching the progress of communism the attitudes of voters in two key European countries today assume great significance.

Evidence furnished by public opinion polls just completed in France and Italy indicates that in those two nations the anti-communist forces still hold the support of a majority of voters.

The polls were conducted by the French Institute of Public Opinion and the Italian Institute of Public Opinion, DOXA, two of the eleven foreign affiliates of the American Institute of Public Opinion, George Gallup, director.

In Italy, where the threat of Communist domination is serious and immediate, the latest poll of political sentiment indicates that the Communist Party and its affiliates probably would not become the majority party if the elections were held today. Moreover, if the older voters, who are overwhelmingly opposed to communism, can be induced to go to the polls in large numbers on Apr. 18, the possibility that the Communist Party can obtain a majority is remote.

In France, Gen. Charles de Gaulle receives the largest single number of votes to succeed Robert Schumann as President of the Council, should the present government be overthrown. In this popularity test the combined strength of two Communist Party officials, Maurice Thorez and Jacques Duclos, amounts to about two thirds of General de Gaulle's. Total votes received by personalities of the centrist parties outweigh the support given either de Gaulle or the two Communists.

Further evidence in both nations of strong opposition to the spread of communism comes from another poll. The vast majority of Italian and French people, according to this survey, approve the Marshall Plan, which is, of course, directly contrary to the international Communist propaganda line. In both countries the approval vote was roughly five to one.

Strong evidence exists in a pre-

vious survey that the people in France and Italy do not believe Russian charges that the United States is motivated by imperialistic designs. Quite to the contrary, sizable majorities are inclined to label Russia itself an aggressor nation and to believe the United States would fight only in self defense.

Indication that the French people are convinced their destiny is closely tied to the United States rather than to Russia is given in a poll showing that seven out of ten voters feel we will do more than any other nation to promote economic recovery in France.

Moreover, there is firm conviction on the part of French voters that an economic union of Western European countries must be organized as a bulwark against the strength of the eastern bloc of nations Russia has built. Two out of three voters approve such a union composed of France, England, the Benelux countries and Western Germany.

The questions and answers on which these observations are based follow:

In Italy:

"In Italy's interest which party or group should become stronger?"

It must be emphasized that this question asks only what party the respondent thinks should be stronger and does not ask which way he is going to vote. For that reason the results in no sense constitute a prediction of the election but indicate current sentiment.

The Christian-Democrat Party is headed by Alcide de Gasperi, the present premier, and is the leading anti-communist party.

The answers:

	Communists and affiliates	Moderate Socialists	Christian Demo.	Rightist Parties	Undecided
	Pct	Pct	Pct	Pct	Pct
National	20	13	36	14	17
Men	27	17	26	16	14
Women	12	8	48	11	21
Employer	7	20	33	31	9
Worker	42	15	21	8	14
Farmers	15	12	39	15	19

Italian Communists Unlikely To Become Majority Party; De Gaulle Popularity High

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In France:

"Do you approve or disapprove of Robert Schuman as President of the Council?"

The national answers:

	Today Pct	Feb. Pct	Jan. Pct
Approve	40	31	46
Disapprove	25	29	26
No opinion	35	40	28

"If the Schuman government were to be overthrown whom would you like to see as new President of the Council?"

	Pct
General de Gaulle	17
Leon Blum	11
Maurice Thorez	7
Edouard Herriot	6
Georges Bidault	5
Jacques Duclos	4
Paul Reynaud	4
Paul Ramadier	1
Guy Mollet	1
Others	10
No Opinion	34

"Which nation, in your opinion, will aid France most in her recovery?"

	Pct
U. S.	70
Russia	7
Great Britain	2
None	6
France alone	6
Other	3
No opinion	6

"Do you favor or oppose an economic union of the Western European countries (France, England, Belgium, Holland, Luxembourg, Italy and Western Germany)?"

	Pct
Favor	68
Oppose	14
No opinion	18

On the Marshall Plan:

"Have you heard or read about the Marshall Plan?"

	Have Heard Pct.	Have Not Pct.
Italy	78	22
France	91	9

Exposé of Exports to Russia Works Hardship on Builders

• • • International developments, specifically the relation of the U. S. government with Russia, have brought the machine tool industry in the past few days into the arena for a disproportionate dose of editorial treatment.

Machine tool builders are not being castigated, but some of the sentiments expressed in news organs and various journals of opinion suggest that anybody, including machine tool builders, who has anything to do with the Russians in any way, shape or form, will shortly be regarded in an unfavorable light.

The machine tool industry, according to spokesmen, has been after State Dept. people for a definite policy in regard to doing business with Russia, for the past year. Every machine tool builder knows any machine sent to Russia is an addition of the war potential.

At the present time, there are a number of machine tool companies with machines on the assembly floor or in less advanced stages of completion that were ordered by Russia a year ago or longer. One company is reported to have \$250,000 tied up in Russian orders, mostly completed, and special to the extent that they are not marketable in the United States. Many machine tool builders cannot stand, financially, to take cancellation losses of this size.

Applications for the export of machine tools to Russia have been held up and, according to reports, must be cleared with the State and Commerce Depts.

* * *

Following the release of Jess Larson, War Assets Administration administrator to WAA zone administrators and regional directors, it is estimated (by WAA) that there are about 64,000 machine tools left (acquisition costs \$288 million) and that JANMAT will put the bite on this stock for all but 20,000 which will probably be the amount WAA will have to dispose

Recent Political Developments Arouse Comment on Some Longstanding Orders

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of between now and June 30 (\$90 million).

Fixed price sales will end Apr. 4. As fast as stocks are screened by JANMAT, the residual tools will be thrown on the market on a competitive bid basis as individual tools with a 30-day inspection period; leftovers will then be offered on a tonnage basis. During the competitive bidding, priority rights will be recognized. These tools will generally be in O-4 condition—10 years old or more. These tonnage sales will be offered to all classes of customers, no holds barred.

Tools which have been tagged by JANMAT but released for any reason will bear a new price schedule—N-1, 90 pct of acquisition; N-2, 85 pct; N-3 and O-1, 80 pct; O-2, 70 pct; and O-3, 60 pct of acquisition cost. If they are not bought at these prices they go right back into the stockpile.

In Philadelphia dealers report a severe decline in inquiries and orders for new and used tools. All factors say the market is price conscious and point to the influx of lathe orders to beat the price increase deadline. Limited buying of new tools is confined to specialized production machinery where profitable returns can be demonstrated. Price consciousness has converted some requirements into orders for used tools although the volume is low. Used tool interest centers around radial drills, planers, shapers, milling machines and lathes.

In discussing the cooperative program for education in sales and service problems, one dealer here observes that sales techniques are a negligible factor in the marketing of machine tools. A knowledge of

machinery and its application to production problems is considered much more valuable as a sales tool. Unfortunately, the higher grade men who have adequate knowledge in this field are in a position to command higher salaries than can be paid by builders and dealers.

Reports from dealers in other major sales sectors indicate that business is a little slow. There are a few orders to be found here and there, but most of the business being placed in by the larger companies, which some representatives are inclined to take as a healthier trend than getting the business all in one spot.

It is understood that a number of small shops are pinched for steel, particularly bar stock, and this is a definite factor in their machine tool ordering.

Trade sources report that the machine tool industry is likely to come in for about \$12 million in new firm orders under the Marshall Plan, about \$7 million more than originally estimated.

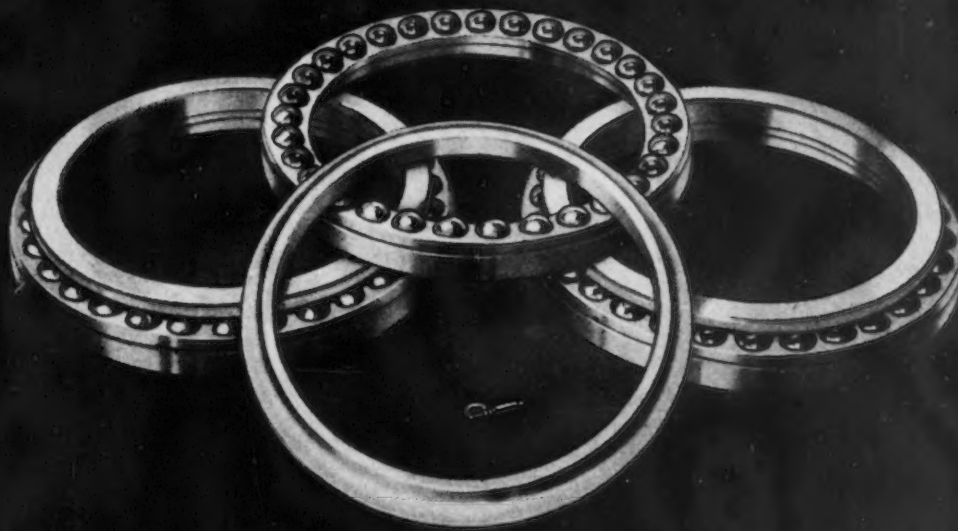
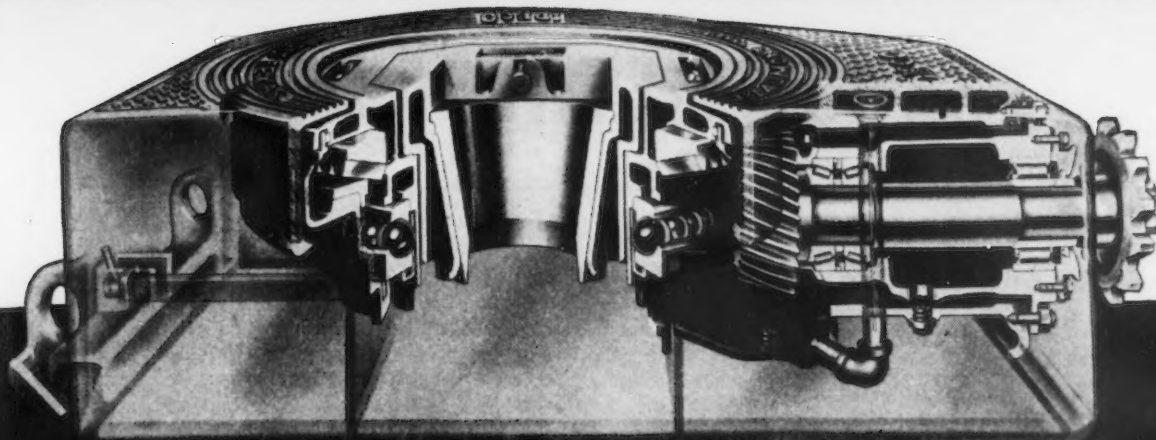
Rumor has it that the War Dept. is placing some business, but it is unlikely that any orders for machine tools have been placed at this stage of the game.

Foundry Group Organizes

Fort Wayne, Ind.

• • • The Northern Indiana Management Group, Gray Iron Founders' Society, was formally organized at a recent meeting held at the Indiana Hotel, Fort Wayne.

The group, one of a series of 40 being organized throughout the United States, elected as its chairman, John E. McIntyre, vice president and general manager, Sibley Machine & Foundry Corp., and director, Gray Iron Founders' Society; vice chairman, C. F. Sterling, president, Sterling Castings Corp., Bluffton, Ind., and secretary-treasurer, James E. Digan, president Logansport Foundry Industries, Inc., Logansport, Ind.



KAYDON ANGULAR THRUST BEARINGS — USED ON ROTARY TABLES OF OIL DRILLING RIGS

CONTACTING KAYDON was the RIGHT IDEA for IDECO*

No manufacturer of heavy-duty machinery can afford to compromise on bearings, the very heart of efficient operation... particularly in powerful oil field rotary tables where the tremendous loads demand super-rugged, high precision bearings.

IDECO is one of many of America's outstanding machinery builders who find KAYDON Bearings are right! On the 14½" IDECO Rotary Table for Drilling Rigs 22.750" OD bearings are used... the 17¼" IDECO Streamlined Rotaries use bearings 29.250" OD...

the 23", 36.000" OD bearings... the 27½", 39.625" OD bearings... big, rugged, but smooth and reliable in performance as a fine watch movement!

Other heavy machinery engineers also find it's the right idea to "Contact KAYDON" for bearings that more than meet the demands of steel mill and paper mill machinery, excavators, loaders, cranes, hoists, crushers, food processing and all types of heavy-duty equipment.

Counsel in confidence with KAYDON. Capacity now available for all sizes and types of KAYDON Bearings.

THE KAYDON ENGINEERING CORP., MUSKEGON, MICH.

All types of Ball and Roller Bearings 4" bore to 120" outside diameter

This advertisement No. 484 — appears in these publications: IRON AGE • OIL & GAS JOURNAL

THE IRON AGE, April 1, 1948—127



KAYDON Types of
Standard or Special
Bearings:

- Spherical Roller
- Taper Roller
- Ball Radial
- Ball Thrust
- Roller Radial
- Roller Thrust

NONFERROUS METALS

... News and Market Activities

Continuous Annealing Of Strip By Germans

New York

• • • Relative advantages of large brass mills with their high overhead costs and the smaller mills common to German wartime and prewar practice were canvassed by Edwin W. Rouse, assistant to the vice-president, Revere Copper & Brass, Inc. in his visits to 12 principal German nonferrous rolling mills under the auspices of the Office of Technical Services, Dept. of Commerce.

All German mills were relatively small in comparison with domestic plants. All mills rolling copper and brass were inefficient judged by domestic production standards, because of the use of 4-high reversing run down mills rolling down to finished gage. This practice requires frequent roll changes which builds up labor time but permits the maintenance of low mill inventories. High labor costs in domestic mills make it more economical to produce large tonnage runs without gage changes.

The attitude of German plant managers to the use of their low-cost labor was indicated in a brass tube mill where there were 35 drawbenches, of which only one was equipped for accelerated speed draws. When questioned on the reason for this failure to take advantage of important developments, the German response was that there was no need for it as it would merely serve to save labor.

German mills were all using continuous strip annealing equipment. Each unit had only small capacity, and additional capacity required additional units. Domestic mills could not employ this equipment

as it would slow down their production. Domestic annealing is done in coils which involves the danger of crushed edges. Domestic practice involves the use of precautions to prevent bad steep edges due to crushing. However, development of continuous high speed strip annealing equipment would make this unnecessary.

Scrap Market Moves Up

• • • The scrap market moved higher on copper and brass grades last week and on some grades of aluminum. Refiners are paying $\frac{1}{4}$ ¢ more for copper and brass items. Ingot makers' prices, as much as a cent per pound below refiners prices for copper, have been increased but they are unable to obtain any grades except brass and composition. Ingot makers' aluminum buying prices have been increased for some grades due to the scarcity of scrap. These increases in buying prices have been reflected in higher dealer buying prices.

Copper

• • • Consumer pressure for copper is unchanged. Demand from wire mills and brass mills continues at high levels even though fabricators' copper statistics for February indicate a drop in order backlogs of 31,500 tons, to a total of 302,103 tons. The same report showed that the deficiency of fabricators' stocks of copper for bookings dropped to 96,460 tons, a decline of 25,000 tons in a month. Nevertheless the sentiment of all factors in the market is bullish on future demand. Foreign orders and inquiries must

be turned away by all producers in view of domestic demand. There is no doubt in the industry that the passage of ERP will step up foreign copper consumption, but no one can hazard an opinion as to where the additional copper will come from.

Tin Committee Doubles Its 1948 Allocations

Washington

• • • Combined Tin Committee has announced further allocations of tin for the first half. With the interim allocations previously announced, the quantity of tin to be distributed to meet requirements for the first half of 1948 totals 33,241 long tons. These tonnages are expected to represent final allocations for the first half for most of the countries listed below. It may, however, be possible for the Committee to make small additional allocations after a further review of the supply position in May.

Listed below are the allocations previously announced on Jan. 14, 1948, allocations announced in the interval and the new allocations made at the Committee's most recent meeting.

Tin Allocations in First Half 1948
(long tons)

Consuming Country	Jan. 14	Total to Mar. 24
Brazil	300	300
Canada	1,090	1,905
Ceylon	32	32
Czechoslovakia	336	586
Denmark	160	280
Egypt	60	164
Finland	2,720	195
France	324	4,760
Germany (US/UK Zone) ..	120	564
Germany (French Zone) ..	100	120
Hongkong	1,400	175
India	20	2,450
Ireland	80	20
Mexico	146	254
New Zealand	35	110
Norway	55	395
Pakistan	520	55
Palestine	80	870
Poland	280	80
Rumania	700	280
South Africa	200	700
Sweden	140	335
Switzerland	10,200	245
Turkey	35	17,850
United States	230	35
Uruguay	190	230
Yugoslavia	100	190
*Others	17,703	33,241

* Latin America, other than Argentina, Brazil, Chile, Uruguay and Mexico; and Middle East, other than Egypt, Palestine, Syria and Iran. These countries are normally provided for by individual allocations.

Nonferrous Metals Prices

Cents per pound

	Mar. 24	Mar. 25	Mar. 26	Mar. 27	Mar. 29	Mar. 30
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	94.00	94.00	94.00	94.00	94.00	94.00
Zinc, East St. Louis	12.00	12.00	12.00	12.00	12.00	12.00
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

NONFERROUS METALS PRICES

Primary Metals

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, 10,000 lb. f.o.b. shipping point, freight allowed....	15.00
Aluminum pig, f.o.b. shipping point....	14.00
Antimony, American, Laredo, Tex....	33.00
Beryllium copper, 3.75-4.25% Be, dollars per lb contained Be.....	\$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be.....	\$40.00
Cadmium, del'd	\$1.75
Cobalt, 97-99% (per lb).....	\$1.65 to \$1.72
Copper electro, Conn. Valley.....	21.50
Copper, lake, Conn. Valley.....	21.625
Gold, U. S. Treas., dollars per troy oz....	\$225
Iridium, 99.8%, dollars per troy oz....	\$225
Iridium, dollars per troy oz....	\$95 to \$105
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots.....	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York.....	\$76.50 to \$77
Nickel, electro, f.o.b. New York.....	36.56
Palladium, dollars per troy oz....	\$24.00
Platinum, dollars per troy oz....	\$72 to \$75
Silver, New York, cents per oz....	74.625
Tin, Grade A, New York.....	94.00
Zinc, East St. Louis.....	12.00
Zinc, New York	12.61
Zirconium copper, 6 pct Zr, per lb contained Zr.....	\$8.75

Remelted Metals

Brass Ingot

(Cents per lb. in carloads)

85-5-5-5 ingot	
No. 115	19.00-19.25
No. 120	18.50-18.75
No. 123	18.00-18.25
80-10-10 ingot	
No. 305	24.25
No. 315	21.75
88-10-2 ingot	
No. 210	30.00
No. 215	28.00
No. 245	21.75-22.75
Yellow ingot	
No. 405	15.00-16.00
Manganese bronze	
No. 421	18.00

Aluminum Ingot

(Cents per lb. lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper, max.	17.50-17.75
0.60 copper, max.	17.25-17.50
Piston alloys (No. 122 type)....	16.50-16.75
No. 12 alum. (No. 2 grade)....	16.25-16.75
108 alloy	16.25-16.75
195 alloy	16.50-16.75
AXS-679	16.50-17.00
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1-95 pct-95½ pct.....	16.50-17.00
Grade 2-92 pct-95 pct.....	16.00-16.50
Grade 3-90 pct-92 pct.....	15.75-16.00
Grade 4-85 pct-90 pct.....	15.25-15.50

Electroplating Supplies

Anodes

(Cents per lb. f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer.....	37%
Electrodeposited	32%
Rolled, oval, straight, delivered....	33.09
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer.....	33%
Zinc, cast, 99.99	20.50
Nickel 99 pct plus, frt. allowed	
Cast	51
Rolled, depolarized	52
Silver 999 fine	
Rolled, 1000 oz lots per troy oz....	67½

Chemicals

(Cents per lb. f.o.b. shipping point)

Copper cyanide, 100 lb drum.....	43.00
Copper sulfate, 99.5, crystals, bbls....	11.50
Nickel salts, single, 425 lb bbls. frt. allowed	14.50
Silver cyanide, 100 oz. lots, per oz.	54.00
Sodium cyanide, 96 pct domestic, 100 lb drums	15.00
Zinc cyanide, 100 lb drums.....	34.00
Zinc sulfate, 89 pct, granules, bbls, frt. allowed	7.75

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb., f.o.b. shipping point, freight allowed.)

Flat Sheet: 0.188 in., 2S, 3S, 24¢; 4S, 61S-O, 25.8¢; 52S, 27.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢. 0.081 in., 2S, 3S, 25¢; 4S, 61S-O, 27.1¢; 52S, 29¢; 24S-O, 24S-OAL, 27.7¢; 75S-O, 75S-OAL, 34.3¢. 0.032 in., 2S, 3S, 26.4¢; 4S, 61S-O, 30.1¢; 52S, 32.6¢; 24S-O, 24S-OAL, 34.2¢; 75S-O, 75S-OAL, 43.1¢.	
Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 4S-F, 23.2¢; 52S, 24.2¢; 61S-O, 23.8¢; 24S-F, 24S-FAL, 24.2¢; 75S, 75S-AL, 30.5¢.	
Extruded Solid Shapes: Shape factors 1 to 4; 31¢ to 59¢; 11 to 13, 31.9¢ to 69¢; 25 to 25, 33.4¢ to 90¢; 35 to 37, 40.8¢ to \$1.25; 47 to 49, 58.7¢ to \$1.84.	
Extruded Round Rod, Square, Hex, Octagonal Bar: ¼ in. and over, 27¢ to 38¢; ½ to ¾ in., 28¢ to 40.5¢; ¾ to 1½ in., 29¢ to 43¢; 1½ to 2 in., 30¢ to 46.5¢; 2 to 3 in., 32.5¢ to 53.5¢; 3 to 4 in., 35.5¢ to 62¢.	
Rolled Rod: 1.064 to 4.5 in., 2S, 3S, 30¢ to 26.5¢; Cold-finished rod, 0.375 to 3.5 in., 2S, 3S, 32¢ to 28¢.	
Screw Machine Stock: Drawn, ¼ to ½ in., 11S-T3, 34¢ to 45¢; cold-finished, ¾ to 1½ in., 11S-T3, 33¢ to 31¢; rolled, 1½ to 3 in., 11S-T3, 31¢ to 28.5¢.	
Drawn Wire: coiled, 0.051 to 0.374 in.; 2S, 33¢ to 24¢ 52S, 40.5¢ to 29¢; 56S, 42.5¢ to 34.5¢; 17S-T4, 46¢ to 31¢; 61S-T4, 41¢ to 30.5¢; 75S-T6, 66¢ to 46¢.	

Magnesium

(Cents per lb. f.o.b. mill, freight allowed.)

Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSA. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-1.01¢; 22, \$1.22-\$1.31; 24, \$1.62-\$1.75. Specification grade higher.	
Round Rod: M, diam., in., ¼ to ¾, 47¢; ½ to ¾, 45¢; 1½ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.	
Square, Hexagonal Bar: M, size across flats, in., ¼ to ¾, 52.5¢; ½ to ¾, 47.5¢; 1½ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.	
Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.	
Round Tubing: M, wall thickness, outside diam., in., 0.049 to 0.057, ¼ to ¾, \$1.21; ¾ to 1, \$1.12; 1 to 1½, 97¢; 0.058 to 0.064, 1½ to 2, 89¢; 2 to 3, 81¢; 0.065 to 0.082, ¾ to 1, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 69¢; 3 to 4, 57¢. Other alloys higher.	

Nickel and Monel

(Cents per lb. f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	41	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	31	31

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded	Rods	Sheets
Copper	33.53	...	33.68
Copper, hot-rolled	30.03	...	...
Copper, drawn	31.03	...	...
Low brass	34.36*	31.39	31.70
Yellow brass	32.92*	29.85	30.16
Red brass	34.89*	31.92	32.23
Naval brass	30.28	29.03	34.97
Leaded brass	28.64	24.69	...
Commercial			
bronze	35.68*	32.96	33.27
Manganese bronze	33.87	32.37	38.47
Phosphor bronze, 5 pct	53.95*	52.95	52.70
Muntz metal	29.80	28.55	32.99
Everdur, Herculey, Olympic, etc. ..	37.24	37.50	38.56
Nickel silver, 10 pct.	41.80	42.68	40.54
5 pct .....	...	...	38.98
Architectural			
bronze	28.61	...	...
*Seamless tubing.			

Scrap Metals

Brass Mill Scrap

(Cents per pound; add 1¢ per lb for shipments of 15,000 lb or more.)

	Heavy	Turn-ings
Copper	19½	18½
Yellow brass	15½	14½
Red brass	17½	16½
Commercial bronze	17½	16½
Manganese bronze	15½	14½
Leaded brass rod ends....	15½	...

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery.)

No. 1, copper, wire	18.50
No. 2 copper, wire	17.50
Light copper	16.50
Refining brass	15.75-16.00*

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer.)

No. 1 copper, wire.....	17.50-17.75
No. 2 copper, wire.....	16.50-16.75
Light copper	15.50-15.75
No. 1 composition	14.50
No. 1 comp. turnings	14.00
Rolled brass	11.75
Brass pipe	11.00-11.25
Radiators	11.25-11.50
Heavy yellow brass	10.50

Aluminum

Mixed old cast	9.75
Mixed old clips	9.50
Mixed turnings	8.75
Pots & pans	10.00
Low copper	10.50-10.75

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire....	16½-16¾
No. 2 heavy copper and wire....	15½-15¾
Light copper	14-14½
Auto radiators (unsweated)....	9½-10
No. 1 composition	12½-13
No. 1 composition turnings....	12-12½
Clean red car boxes	9½-10
Cocks and faucets	9½-10
Mixed heavy yellow brass....	7½-8½
Old rolled brass	8½-8¾
Brass pipe	9½-9¾
New soft brass clippings....	12-12½
Brass rod ends	9½-10½
No. 1 brass rod turnings....	9½-9¾

Aluminum

Alum. pistons with struts....	4½-5
Aluminum crankcases	7-7½
2S aluminum clippings	9-9½
Old sheet & utensils	7-7½
Dry borings and turnings....	2½-3
Misc. cast aluminum	6½-7
Dural clips (24S)	6-6½

Zinc

New zinc clippings	7½-8
Old zinc	5-5½
Zinc routings	3-3½
Old die cast scrap	3½-4

Nickel and Monel

Pure nickel clippings	16-17
Clean nickel turnings	12½-13
Nickel anodes	16-17
Nickel rod ends	16-17
New Monel clippings	12-13
Clean Monel turnings	7-8
Old sheet Monel	10-10½
Old Monel castings	7½-8
Inconel clippings	8-8½
Nickel silver clippings, mixed	8-8½
Nickel silver turnings, mixed	6½-7

Lead

Soft scrap lead	13-13½
Battery plates (dry).....	7½-7¾

Magnesium Alloys

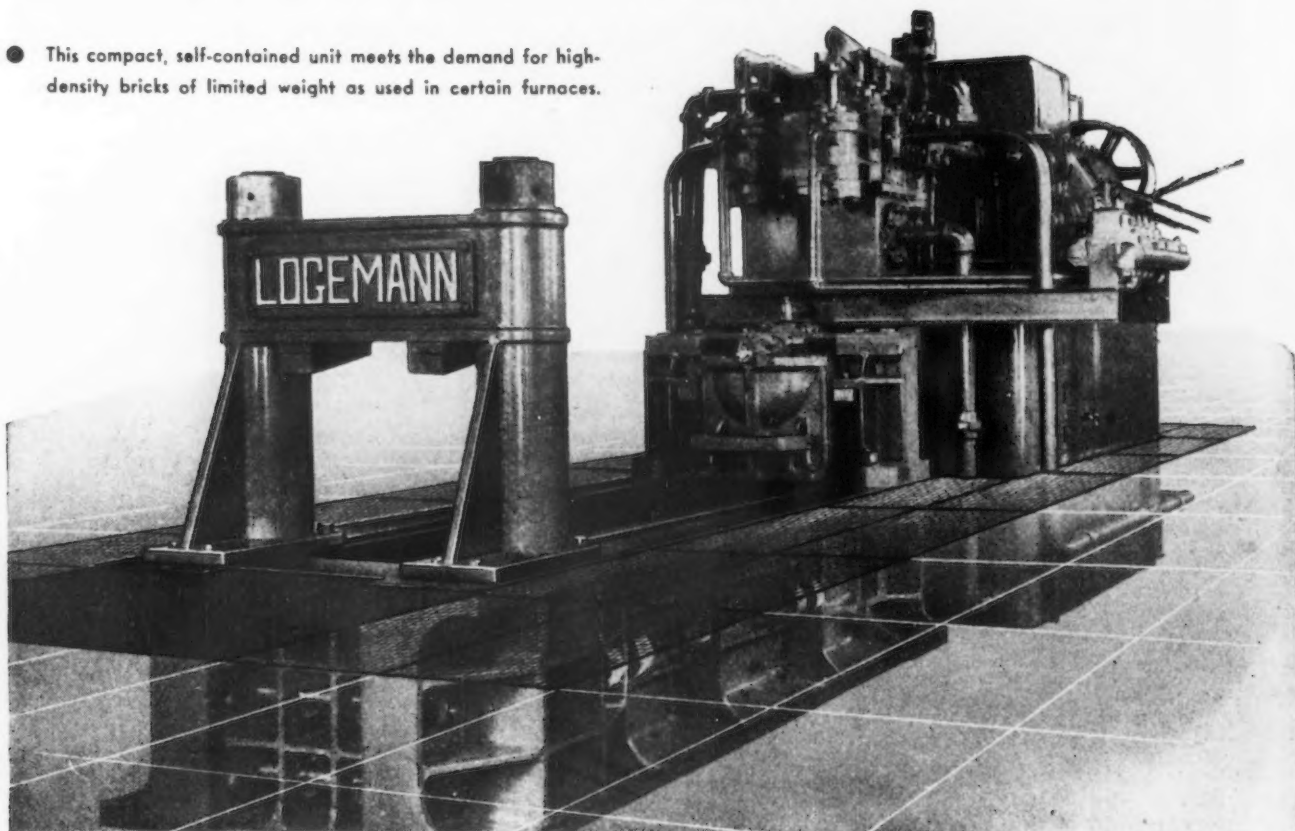
Segregated solids	7½-8
Castings	4½-5½

Miscellaneous

Block tin	75-77
No. 1 pewter	60-62
No. 1 auto babbitt	45-47
Mixed common babbitt	13½-14½
Solder joints	16½-17½
Siphon tops	45-47
Small foundry type	16½-16¾
Monotype	15½-15¾
Lino. and stereotype	14½-14¾
Electrotype	13½-13¾
New type shell cuttings....	14½-15
Hand picked type shells....	6½-7
Lino and stereo dross....	6½-7
Electro dross	5½-6

For High Density Bales . . . use the Self-Contained **LOGEMANN Scrap Presses**

- This compact, self-contained unit meets the demand for high-density bricks of limited weight as used in certain furnaces.



Press, Pump, Tank . . . all in one compact assembly

Available with Automatic Control

Both two and three ram models are available with automatic controls . . . and are recommended when the nature of the scrap warrants such application and where high output is desired.

You conserve floor space and piping in plants and yards where space is limited . . . and at the same time, handle high tonnages at extremely low operating cost.

Pioneers in the metal baling field, LOGEMANN engineers have embodied the features proved through actual operation to be essential to constant, uninterrupted service. These same engineers are prepared to offer suggestions as to operating layout and installation of any unusual or specific need. Present your problem to them, stating the nature of your scrap and the tonnage desired. There is no obligation.

LOGEMANN BROTHERS CO.
3164 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN

SCRAP

... News and Market Activities

Market Is Firm But Faces Cutbacks

New York

• • • **Biggest news in the markets** this week, as in industrial quarters generally, is the current coal shortage. Needless to say the outlook is glum. Many of the foundries operate on small stockpiles, at least compared to the mills, with the result that cast items are expected to slow down first.

Steelmaking scrap continued to move with the activity and general market stability which was established almost a month ago. Dealers' receipts have generally continued to be good and the material is being passed along with no wasted time, as the mills and dealers are anxious to do as much business as they can before any embargo on rail shipments begins.

In that connection, plans by the railroads for curtailing shipments have not been clarified yet and officials, aside from their announcement that shipments are to be cut 25 pct, have not established the system for accomplishing this. It is commonly expected though that some method for determining comparative normal requirements will be set up, and then only three-fourths of that number of cars will be supplied.

An interesting dodge for avoiding expensive foundry grades popped up in Chicago where some foundries began briquetting cast iron borings for use in place of more expensive material. Briquetting expense run about \$10 a gross ton and still left a substantial margin of savings.

Certainly by the second week in April a clearer picture of mill cutbacks and the seriousness of the coal situation will be shown—in fact, the rat race should really be on—but at the moment it is difficult to guess whether or not the miners will be back at work and what the effects on scrap prices will be.

PITTSBURGH—The market this week has a strong price undertone. Shipments have improved as they normally do at this time, but demand is reported heavier. Mills are asking that cars be speeded up but there is no tone of frantic haste that

might quickly push prices through the formula roof. The idea last week was to get cars rolling to beat the expected 25 pct cut in freight shipments. Turnings were a trifle stronger, with all grades up 50¢. No. 1 cast was \$2 higher, heavy breakable was \$1 stronger.

CHICAGO—The market was very slow last week. Dealers scrap which one mill was able to buy in large quantities at \$37.50 two weeks ago has firmed up. Brokers are paying \$39 to dealers to fill all types of openhearth scrap orders and certain mills are now accepting dealer scrap at the same price as No. 1 industrial. Steel foundries in general have good inventories. The railroad specialties sold on recent lists showed little variation over previous prices. Some foundries are now briquetting cast iron borings to replace more expensive scrap. The total cost of the briquettes to the foundries is about \$45.00 a gross ton. This eventually may weaken the high priced foundry scrap depending on the tonnage of borings available.

PHILADELPHIA—The scrap market here continued firm last week without any evidence of a slowing up in demand due to the coal shutdown or the spring weather. Mill stocks are not satisfactory for present operations. Most mills in the area are oil fired and have not yet been required to close down operations. Somewhat larger tonnages are reported to be coming out in this whether but the volume is disappointing compared to what had been expected by the mills. Present plans of mills call for a continuation of scrap shipments even when operations have to be reduced.

CLEVELAND—Talk of military preparedness for the past 10 days has tightened up the scrap market here and in the Valley, and the possibilities of the market breaking below the formula prices are very remote at the moment. Shipments are holding up fairly well, but most consumers could use more material than they are getting. Another week of the coal strike may change the picture to some extent, if steel making operations are curtailed more, but most consumers will probably continue to take all the shipments they can get and put the material on the ground.

DETROIT—While serious constrictions in scrap generation and scrap flow are expected to result from any prolonged coal tie-up or extensive curtailment of rail shipments, scrap shipments during the past 3 weeks have been somewhat easier according to informed sources. Present indications are that in the event of rail curtailments Detroit mill buyers will attempt to utilize diesels to deliver scrap to local mills. With new GM die programs calling for large tonnages, gray

iron scrap prices are somewhat firmer this week and the supply is none too plentiful.

BIRMINGHAM—Reduced iron and steel production rates that occurred in this district soon after the beginning of the coal mine strike have had little effect on scrap demand. Cast grades are particularly strong. Movement of shipyard material is off with few ships left at Gulf ports for scrapping.

BUFFALO—Sharp reduction in operations by one of the leading consumers here last week because of the coal strike was not reflected in the scrap market. Mills continued to press for speedy delivery and the bugaboo of a holdup in shipments was declared non-existent. Dealers took more orders for openhearth grades at unchanged prices as old contracts were completed. Top price for No. 1 heavy melting slipped another dollar to \$44 and an increase in No. 1 shipments on allocation to mills at the \$39.75 ceiling was reported, particularly from down state points, which provided a wide spread in that item. Shovelings were easier. One leading mill was said to be offering \$2 under the \$36.75 formula and nearby electric furnace users were bidding \$36 delivered, or about \$34.25 Buffalo. Cast scrap was strong. Sales of mixed cupola were made at \$65, an advance of \$3 a ton.

BOSTON—Foundries still resist cast prices and the market is lower as a result. Machinery cast has dropped \$4 to \$5 a ton and heavy breakable \$3. Other varieties of scrap are moving well at formula prices. Sales of busheling outstrip all others.

CINCINNATI—Demand is strong and scrap continues to move fairly well at formula prices. Talk of a 25 pct reduction in freight hauling as a coal conservation measure is in the wind, and if the reduction is put into effect some consumers are likely to feel the pinch.

ST. LOUIS—Market has been steady with fair shipments over the past week. Mills buying prices for April were expected to be unchanged, but the coal situation will probably have something to say on that.

TORONTO—Despite the serious shortage of steelmaking scrap in Canada, no effort has been made to stimulate domestic collections in rural areas by increasing ceiling prices. The ceiling on No. 1 bundles and heavy melting steel is \$22 per ton delivered Hamilton and collectors point out that at this level there is no profit in going far afield to pick up steel grades. Iron scrap, however, is not under price control and No. 1 cast is selling at \$42 to \$46 per ton delivered and No. 2 at \$35 to \$37. However, there is still some hope that the large stocks of scrap in the farm communities will be brought to the markets this spring and some action along this line should be started soon.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$40.00 to \$40.50
RR. hvy. melting.....	41.00 to 41.50
No. 2 hvy. melting.....	40.00 to 40.50
RR. scrap rails.....	55.00 to 56.00
Rails 2 ft and under.....	62.00 to 63.00
No. 1 comp'd bundles.....	40.00 to 40.50
Hand bld. new shts.....	40.00 to 40.50
Hvy. axle turn.....	41.50 to 42.00
Hvy. steel forge turn.....	41.50 to 42.00
Mach. shop turn.....	35.50 to 36.00
Shoveling turn.....	38.00 to 38.50
Mixed bor. and turn.....	35.50 to 36.00
Cast iron boring.....	38.00 to 38.50
No. 1 cupola cast.....	63.00 to 65.00
Hvy. breakable cast.....	52.00 to 53.00
Malleable.....	77.00 to 79.00
RR. knuck. and coup.....	54.00 to 55.00
RR. coil springs.....	54.00 to 55.00
RR. leaf springs.....	54.00 to 55.00
Rolled steel wheels.....	54.00 to 55.00
Low phos.....	47.00 to 47.50

CHICAGO

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$38.50 to \$39.50
No. 2 hvy. melting.....	38.50 to 39.50
No. 1 bundles.....	38.50 to 39.50
No. 2 dealers' bundles.....	38.50 to 39.50
Bundled mach. shop turn.....	37.00 to 37.50
Galv. bundles.....	35.00 to 35.50
Mach. shop turn.....	33.50 to 34.50
Short shov. turn.....	35.00 to 36.50
Cast iron borings.....	34.50 to 35.50
Mix. borings & turn.....	33.50 to 34.50
Low phos. hvy. forge.....	44.00 to 48.00
Low phos. plates.....	42.50 to 45.00
No. 1 RR. hvy. melt.....	41.25 to 41.75
Rerolling rails.....	50.00 to 51.00
Miscellaneous rails.....	48.00 to 49.00
Angles & splice bars.....	49.00 to 51.00
Locomotive tires, cut.....	51.00 to 52.00
Cut bolster & side frames.....	47.00 to 48.00
Standard stl. car axles.....	56.00 to 57.00
No. 3 steel wheels.....	47.00 to 50.00
Couplers & knuckles.....	47.00 to 49.00
Rails, 2 ft and under.....	54.00 to 56.00
Malleable.....	71.00 to 73.00
No. 1 mach. cast.....	68.00 to 70.00
No. 1 agricul. cast.....	63.00 to 64.00
Heavy breakable cast.....	50.00 to 52.00
RR. grate bars.....	58.00 to 59.00
Cast iron brake shoes.....	55.00 to 57.00
Cast iron carwheels.....	57.00 to 58.00

CINCINNATI

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$38.50 to \$39.50
No. 2 hvy. melting.....	38.50 to 39.50
No. 1 bundles.....	38.50 to 39.50
No. 2 bundles.....	38.50 to 39.50
Mach. shop turn.....	33.00 to 33.50
Shoveling turn.....	35.00 to 35.50
Cast iron borings.....	32.50 to 33.00
Mixed bor. & turn.....	32.50 to 33.00
Low phos. plate.....	46.00 to 48.00
No. 1 cupola cast.....	63.00 to 64.00
Hvy. breakable cast.....	53.00 to 54.00
Rails 18 in. & under.....	59.00 to 60.00
Rails random length.....	51.00 to 52.00
Drop broken.....	66.00 to 68.00

BOSTON

Per gross ton, f.o.b. Boston	
No. 1 hvy. melting.....	\$31.65 to \$31.90
No. 2 hvy. melting.....	31.65 to 31.90
Nos. 1 and 2 bundles.....	31.65 to 31.90
Busheling.....	31.65 to 31.90
Shoveling turn.....	28.90
Machine shop turn.....	26.90
Mixed bor. & turn.....	26.90
Cl'n cast. chem. bor.....	36.00
No. 1 machinery cast.....	55.00 to 57.00
No. 2 machinery cast.....	55.00 to 57.00
Heavy breakable cast.....	53.00 to 55.00
Stove plate.....	53.00 to 55.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:	
No. 1 hvy. melting.....	\$35.50
No. 2 hvy. melting.....	35.50
No. 1 bundles.....	35.50
New busheling.....	35.50
Flashings.....	35.50
Mach. shop turn.....	\$29.00 to 29.50
Shoveling turn.....	30.00 to 30.50
Cast iron borings.....	30.00 to 30.50
Mixed bor. & turn.....	28.50 to 29.00
Low phos. plate.....	39.50 to 40.50
No. 1 cupola cast.....	61.00 to 63.00
Heavy breakable cast.....	52.00 to 56.00
Stove plate.....	52.00 to 55.00
Automotive cast.....	62.00 to 65.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$41.00 to \$42.00
No. 2 hvy. melting.....	38.00 to 39.00
No. 1 bundles.....	41.00 to 42.00
No. 2 bundles.....	38.00 to 39.00
Mach. shop turn.....	33.50 to 34.50
Shoveling turn.....	33.50 to 34.50
Mixed bor. & turn.....	33.50 to 34.50
Clean cast chemical bor.....	40.00 to 42.00
No. 1 machinery cast.....	65.00 to 66.00
No. 1 mixed yard cast.....	63.00 to 65.00
Hvy. breakable cast.....	69.00 to 60.00
Clean auto cast.....	63.00 to 65.00
Hvy. axle forge turn.....	41.00 to 42.00
Low phos. plate.....	44.50 to 45.50
Low phos. punchings.....	44.50 to 45.50
Low phos. bundles.....	43.00 to 44.00
RR. steel wheels.....	51.00 to 52.00
RR. coil springs.....	51.00 to 52.00
RR. malleable.....	72.00 to 75.00

ST. LOUIS

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$41.00 to \$42.00
No. 2 hvy. melting.....	37.50 to 38.50
Bundled sheets.....	37.50 to 38.50
Mach. shop turn.....	33.00 to 33.50
Locomotive tires, uncut.....	46.00 to 48.00
Mis. std. sec. rails.....	48.00 to 50.00
Rerolling rails.....	50.00 to 51.00
Steel angle bars.....	57.00 to 58.00
Rails 3 ft and under.....	53.00 to 55.00
RR. steel springs.....	48.00 to 50.00
Steel car axles.....	48.00 to 50.00
Grate bars.....	56.00 to 57.00
Brake shoes.....	54.00 to 55.00
Malleable.....	71.00 to 72.00
Cast iron car wheels.....	54.00 to 55.00
No. 1 machinery cast.....	64.00 to 65.00
Hvy. breakable cast.....	56.00 to 57.00

BIRMINGHAM

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$37.50 to \$38.50
No. 2 hvy. melting.....	37.50 to 38.50
No. 2 bundles.....	37.50 to 38.50
No. 1 busheling.....	37.50 to 38.50
Long turnings.....	25.00 to 26.00
Shoveling turnings.....	27.00 to 28.00
Cast iron borings.....	26.00 to 27.00
Bar crops and plate.....	42.50 to 43.50
Structural and plate.....	42.50 to 43.50
No. 1 cupola cast.....	60.00 to 65.00
Stove plate.....	55.00 to 58.00
No. 1 RR. hvy. melt.....	37.50 to 38.50
Steel axles.....	38.00 to 39.00
Scrap rails.....	44.00 to 45.00
Rerolling rails.....	52.00 to 54.00
Angles & splice bars.....	47.50 to 50.00
Rails 3 ft & under.....	52.00 to 56.00
Cast iron carwheels.....	48.00 to 50.00

YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$40.00 to \$40.50
No. 2 hvy. melting.....	40.00 to 40.50
Mach. shop turn.....	35.00 to 35.50
Short shov. turn.....	37.00 to 37.50
Cast iron borings.....	36.00 to 36.50
Low phos.....	45.00 to 45.50

NEW YORK

Brokers' buying prices per gross ton, on cars:	
No. 1 hvy. melting.....	\$34.50
No. 2 hvy. melting.....	34.50
No. 2 bundles.....	34.50
Comp. galv. bundles.....	\$30.50 to 31.50
Mach. shop turn.....	29.00 to 30.00
Mixed bor. & turn.....	29.00 to 30.00
Shoveling turn.....	31.00 to 32.00
No. 1 cupola cast.....	59.00 to 61.00
Clean auto cast.....	59.00 to 61.00
Hvy. breakable cast.....	54.00 to 56.00
Charging box cast.....	54.00 to 56.00
Stove plate.....	51.00 to 52.00
Unstrp. motor blks.....	50.00 to 51.00
Cl'n chem. cast bor.....	34.50 to 35.50

BUFFALO

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$39.75 to \$44.00
No. 2 hvy. melting.....	39.75
No. 1 bundles.....	39.75
No. 2 bundles.....	39.75
No. 1 busheling.....	39.75
Mach. shop turn.....	34.75
Shoveling turn.....	36.75
Cast iron borings.....	35.75
Mixed bor. & turn.....	34.75
Mixed cupola cast.....	62.00 to 65.00
Charging box cast.....	54.00 to 55.00
Stove plate.....	58.00 to 60.00
Clean auto cast.....	62.00 to 65.00
RR. malleable.....	70.00 to 75.00
Small indl. malleable.....	47.00 to 49.00
Low phos. plate.....	44.75 to 46.00
Scrap rails.....	58.00 to 59.00
Rails 3 ft & under.....	60.00 to 61.00
RR. steel wheels.....	51.00 to 52.00
Cast iron carwheels.....	51.00 to 52.00
RR. coil & leaf spgs.....	51.00 to 52.00
RR. knuckles & coup.....	51.00 to 52.00

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$39.50 to \$40.00
No. 2 hvy. melting.....	39.50 to 40.00
No. 1 bundles.....	39.50 to 40.00
No. 1 busheling.....	39.50 to 40.00
Drop forge flashings.....	39.50 to 40.00
Mach. shop turn.....	34.50 to 35.00
Shoveling turn.....	35.50 to 36.00
Steel axle turn.....	39.50 to 40.00
Cast iron borings.....	35.50 to 36.00
Mixed bor. & turn.....	35.50 to 36.00
Low phos.....	44.50 to 45.00
No. 1 machinery cast.....	65.00 to 70.00
Malleable.....	75.00 to 80.00
RR. cast.....	70.00 to 73.00
Railroad grate bars.....	60.00 to 62.00
Stove plate.....	60.00 to 62.00
RR. hvy. melting.....	40.00 to 40.50
Rails 3 ft & under.....	60.00 to 61.00
Rails 18 in. & under.....	61.00 to 62.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:	
No. 1 hvy. melting.....	\$25.00
No. 2 hvy. melting.....	25.00
No. 2 bales.....	25.00
Per gross ton delivered to consumer:	
No. 3 bales.....	\$19.50
Mach. shop turn.....	16.00
Elec. furn. 1 ft under.....	\$32.00 to 34.00
No. 1 cupola cast.....	34.00 to 37.00
RR. hvy. melting.....	26.00

LOS ANGELES

Per gross ton delivered to consumer:	
No. 1 hvy. melting.....	\$25.50
No. 2 hvy. melting.....	25.50
No. 1 bales.....	25.50
No. 2 bales.....	25.50
No. 3 bales.....	19.50
Mach. shop turn.....	17.50
No. 1 cupola cast.....	\$40.00 to 43.00
RR. hvy. melting.....	26.50

SEATTLE

Per gross ton delivered to consumer:	
No. 1 & No. 2 hvy. melt.....	\$26.00
Elec. furn. 1 ft and under.....	30.00
No. 1 cupola cast.....	40.00 to 42.00
RR. hvy. melting.....	30.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point.	
Heavy melting.....	\$22.00*
No. 1 bundles.....	22.00*
No. 2 bundles.....	21.50*
Mechanical bundles.....	20.00*
Mixed steel scrap.....	19.00*
Mixed borings and turnings.....	17.00*
Rails, remelting.....	23.00*
Rails, rerolling.....	26.00*
Bushelings.....	17.00*
Bushelings, new fact, prep'd.....	18.00*
Bushelings, new fact, unprep'd.....	16.00*
Short steel turnings.....	17.00*
No. 1 cast.....	\$42.00 to 46.00
No. 2 cast.....	\$35.00 to 37.00
*Ceiling Price.	

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel:	Mar. 30, 1948	Mar. 23, 1948	Mar. 2, 1948	Apr. 1, 1947
(cents per pound)				
Hot-rolled sheets	2.80	2.80	2.80	2.50
Cold-rolled sheets	3.55	3.55	3.55	3.20
Galvanized sheets (10 ga.)	3.95	3.95	3.95	3.55
Hot-rolled strip	2.80	2.80	2.80	2.50
Cold-rolled strip	3.55	3.55	3.55	3.20
Plates	2.95	2.95	2.95	2.65
Plates wrought iron	7.25	7.25	7.25	5.95
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.50
Tin and Terneplate:				
(dollars per base box)				
Tinplate (1.50 lb) cokes.	\$6.80	\$6.80	\$6.80	\$5.75
Tinplate, electro (0.50 lb)	6.00	6.00	6.00	5.05
Special coated mfg. ternes	5.90	5.90	5.90	4.90
Bars and Shapes:				
(cents per pound)				
Merchant bars	2.90	2.90	2.90	2.60
Cold-finished bars	3.55	3.55	3.55	3.20
Alloy bars	3.30	3.30	3.30	3.05
Structural shapes	2.80	2.80	2.80	2.50
Stainless bars (No. 302)	26.00	26.00	26.00	26.00
Wrought iron bars	8.65	8.65	8.65	6.15
Wire:				
(cents per pound)				
Bright wire	3.55	3.55	3.55	3.30
Rails:				
(dollars per 100 lb)				
Heavy rails	\$2.75	\$2.75	\$2.75	\$2.50
Light rails	3.10	3.10	3.10	2.85
Semifinished Steel:				
(dollars per gross ton)				
Rerolling billets	\$45.00†	\$45.00†	\$45.00†	\$42.00
Slabs, rerolling	45.00†	45.00†	45.00†	42.00
Forging billets	54.00†	54.00†	54.00†	50.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	61.00
Wire Rods and Skelp:				
(cents per pound)				
Wire rods	2.80	2.80	2.80	2.55
Skelp	2.90	2.90	2.60	2.35
†Net ton				

Pig Iron:	Mar. 30, 1948	Mar. 23, 1948	Mar. 2, 1948	Apr. 1, 1947
(per gross ton)				
No. 2, foundry, Phila.	\$44.61	\$44.61	\$44.61	\$36.51
No. 2, Valley furnace	39.50	39.50	39.50	33.50
No. 2, Southern Cin'ti	43.28	43.28	43.28	34.75
No. 2, Birmingham	37.38	37.38	37.38	29.88
No. 2, foundry, Chicago†	39.00	39.00	39.00	33.00
Basic del'd Philadelphia	44.11	44.11	44.11	36.92
Basic, Valley furnace	39.00	39.00	39.00	33.00
Malleable, Chicago†	39.50	39.50	39.50	33.50
Malleable, Valley	39.50	39.50	39.50	33.50
Charcoal, Chicago	62.46	62.46	62.46	45.99
Ferromanganese†	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is \$1 per ton.
‡ For carlots at seaboard.

Scrap:	Mar. 30, 1948	Mar. 23, 1948	Mar. 2, 1948	Apr. 1, 1947
(per gross ton)				
Heavy melt'g steel, P'gh.	\$40.25	\$40.25	\$40.25	\$39.00
Heavy melt'g steel, Phila.	41.50	41.50	41.00	37.25
Heavy melt'g steel, Ch'go	39.00	39.00	38.75	35.75
No. 1, hy. comp. sheet, Det.	35.50	35.50	35.50	35.00
Low phos. Young'n	45.25	45.25	45.25	41.75
No. 1, cast, Pittsburgh	64.00	62.00	61.00	45.00
No. 1, cast, Philadelphia	65.50	65.50	65.50	50.00
No. 1, cast, Chicago	69.00	69.00	66.50	46.50

Coke, Connellsville:	Mar. 30, 1948	Mar. 23, 1948	Mar. 2, 1948	Apr. 1, 1947
(per net ton at oven)				
Furnace coke, prompt	\$12.50	\$12.50	\$12.50	\$9.00
Foundry coke, prompt	14.00	14.00	14.00	10.25

Nonferrous Metals:	Mar. 30, 1948	Mar. 23, 1948	Mar. 2, 1948	Apr. 1, 1947
(cents per pound to large buyers)				
Copper, electro, Conn.	21.50	21.50	21.50	21.50
Copper, Lake Conn.	21.625	21.625	21.625	21.625
Tin, Grade A, New York	94.00	94.00	94.00	80.00
Zinc, East St. Louis	12.00	12.00	12.00	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	36.56	36.56	36.56	37.67
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

Composite Prices . .

FINISHED STEEL (Base Price)	
Mar. 30, 1948	3.23940¢ per lb.
One week ago	3.23940¢ per lb.
One month ago	3.23940¢ per lb.
One year ago	2.86354¢ per lb.

PIG IRON		SCRAP STEEL	
Mar. 30, 1948	\$40.29 per gross ton	Mar. 30, 1948	\$40.25 per gross ton
One week ago	\$40.29 per gross ton	One week ago	\$40.25 per gross ton
One month ago	\$40.37 per gross ton	One month ago	\$40.00 per gross ton
One year ago	\$33.15 per gross ton	One year ago	\$37.33 per gross ton

HIGH		LOW	
1948	3.23940¢ Feb. 17	3.19411¢ Jan. 6	
1947	3.19411¢ Oct. 7	2.87118¢ Jan. 7	
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	
1943	2.29176¢	2.29176¢	
1942	2.28249¢	2.28249¢	
1941	2.43078¢	2.43078¢	
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	
1939	2.35367¢ Jan. 3	2.26689¢ May 16	
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	
1933	1.95578¢ Oct. 3	1.75836¢ May 2	
1932	1.89196¢ July 5	1.83901¢ Mar. 1	
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	
1929	2.31773¢ May 28	2.26498¢ Oct. 29	

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

HIGH		LOW	
Mar. 30, 1948	\$40.37 Feb. 17	\$39.58 Jan. 6	
One week ago	37.98 Dec. 30	30.14 Jan. 7	
One month ago	30.14 Dec. 10	25.37 Jan. 1	
One year ago	25.37 Oct. 23	23.61 Jan. 2	
	\$23.61	\$23.61	
	23.61	23.61	
	23.61	23.61	
Mar. 20, 1948	\$23.61 Mar. 20	\$23.45 Jan. 2	
Dec. 23, 1947	23.45 Dec. 23	22.61 Jan. 2	
Sept. 19, 1947	22.61 Sept. 19	20.61 Sept. 12	
June 21, 1947	23.25 June 21	19.61 July 6	
Mar. 9, 1947	23.25 Mar. 9	20.25 Feb. 16	
Nov. 24, 1946	19.74 Nov. 24	18.73 Aug. 11	
Nov. 5, 1946	18.84 Nov. 5	17.83 May 14	
May 1, 1946	17.90 May 1	16.90 Jan. 27	
Dec. 5, 1945	16.90 Dec. 5	13.56 Jan. 3	
Jan. 5, 1945	14.81 Jan. 5	13.56 Dec. 6	
Jan. 6, 1945	15.90 Jan. 6	14.79 Dec. 15	
Jan. 7, 1945	18.21 Jan. 7	15.90 Dec. 16	
Jan. 14, 1945	18.71 Jan. 14	18.21 Dec. 17	

Based on averages for basic iron at valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH		LOW	
Mar. 29, 1948	\$41.83 Jan. 29	\$39.75 Mar. 9	
Oct. 28, 1947	42.58 Oct. 28	29.50 May 20	
Dec. 24, 1947	31.17 Dec. 24	19.17 Jan. 1	
Jan. 2, 1948	19.17 Jan. 2	18.92 May 22	
Jan. 11, 1947	19.17 Jan. 11	15.76 Oct. 24	
	\$19.17	\$19.17	
	19.17	19.17	
Jan. 7, 1948	\$22.00 Jan. 7	\$19.17 Apr. 10	
Dec. 30, 1947	21.83 Dec. 30	16.04 Apr. 9	
Oct. 3, 1947	22.50 Oct. 3	14.08 May 16	
Nov. 22, 1947	15.00 Nov. 22	11.09 June 7	
Mar. 30, 1947	21.92 Mar. 30	12.67 June 9	
Dec. 21, 1946	17.75 Dec. 21	12.67 June 8	
Dec. 10, 1946	13.42 Dec. 10	10.33 Apr. 29	
Mar. 13, 1947	13.00 Mar. 13	9.50 Sept. 25	
Aug. 8, 1946	12.25 Aug. 8	6.75 Jan. 3	
Jan. 12, 1947	8.50 Jan. 12	6.43 July 5	
Jan. 6, 1947	11.33 Jan. 6	8.50 Dec. 29	
Feb. 18, 1947	15.00 Feb. 18	11.25 Dec. 9	
Jan. 29, 1947	17.58 Jan. 29	14.08 Dec. 8	

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton unless otherwise indicated. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over. (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (11) Hollowware enameling, gages 29 to 31 only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only. (14) Kaiser Co. prices (15) to 0.035 to 0.075 in. thick by 3/4 to 3 1/2 in. wide. (16) Delivered Los Angeles; add 1/2¢ per 100 lb for San Francisco. (17) Slab prices subject to negotiation in most cases. Some producers charge (18) \$2 more. (19) \$1 per ton more.

Basing Points	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	San Francisco, Los Angeles, Seattle	DELIVERED TO		
INGOTS														
Carbon, rerolling														
Carbon, forging	\$46.00	(per net ton)												
Alloy	\$56.00													
BILLETS, BLOOMS, SLABS														
Carbon, rerolling ¹⁷	\$45.00 ¹⁸	\$45.00 ¹⁸	\$45.00 ¹⁸	\$47.00	\$45.00 ¹⁸	\$45.00 ¹⁸	(per net ton)							
Carbon, forging billets	\$54.00	\$54.00	\$54.00	\$54.00	\$54.00	\$54.00	(per net ton)							
Alloy	\$66.00	\$66.00				\$66.00								
SHEET BARS														
PIPE SKELP	2.90¢						2.90¢							
WIRE RODS	2.80¢ ¹⁹	2.80¢		2.80¢	2.85¢							3.52¢ ¹⁹		
SHEETS														
Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢		(Ashland, Ky. = 2.80¢)	3.54¢ ¹⁸	2.96¢	3.148¢	3.040¢
Cold-rolled ¹	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.53¢		3.71¢	4.00¢	4.016¢
Galvanized (10 gage)	3.95¢	3.95¢	3.95¢		3.95¢		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland = 3.95¢)	4.62¢ ¹⁸	4.298¢	4.190¢
Enameling (12 gage)	3.95¢	3.95¢	3.95¢	3.95¢			3.95¢		4.05¢	3.95¢		4.11¢	4.466¢	4.406¢
Long ternes ² (10 gage)	4.05¢		4.05¢										4.566¢	4.506¢
STRIP														
Hot-rolled ³	2.80¢	2.80¢	2.80¢	2.80¢ ¹⁵	2.80¢		2.80¢				3.60¢ ¹⁸	2.96¢	3.318¢	3.256¢
Cold-rolled ⁴	3.55¢	3.65	3.65¢	3.55¢			3.55¢				(Worcester = 3.75¢)	3.71¢	4.088¢	4.006¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢						3.616¢	
TINPLATE														
Cokes, 1.50 lb ⁵ , base box	\$6.80	\$6.80	\$6.80		\$6.90			\$6.90	\$6.90		(Warren, Ohio = \$6.80)	\$7.248	\$7.140	
Electro, box: 0.25 lb 0.50 lb 0.75 lb														
TERNES, MFG., special coated														
BLACKPLATE, CANMAKING														
55 lb to 70 lb 75 lb to 95 lb 100 lb to 128 lb														
BLACKPLATE, h. e. 29 ga ¹¹	4.75¢	4.75¢	4.75¢		4.85¢			4.85¢	4.85¢				5.198¢	5.090¢
BARS														
Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢				3.625¢ ¹⁸	3.06¢	3.35¢	3.356¢
Rail steel ⁶														
Reinforcing (billet) ⁷	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢			3.325¢ ¹⁸	3.098¢	2.990¢	
Reinforcing (rail)														
Cold-finished ⁸	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢						3.71¢	4.00¢	4.006¢
Alloy, hot-rolled	3.30¢	3.30¢	3.30¢			3.30¢	3.30¢			(Bethlehem, Massillon, Canton = 3.30¢)			3.432¢	
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢				(Canton = 4.10¢)				
PLATE														
Carbon Steel ¹²	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢			(Coatesville = 3.45¢, Claymont = 3.65¢, Geneva, Utah = 3.10¢)	3.838¢ ¹⁴	3.298¢	3.190¢	
Floor plates	4.20¢	4.20¢		4.20¢									4.716¢	4.656¢
Alloy	3.80¢	3.80¢	3.80¢							(Coatesville = 4.80¢)			4.316¢	4.256¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢				(Geneva, Utah = 2.95¢, Bethlehem = 2.80¢)	3.43¢ ¹⁹	3.040¢	2.932¢	
SPRING STEEL, C-R														
0.08 to 0.40 carbon	3.55¢			3.55¢						(Worcester = 3.75¢)				
0.41 to 0.60 carbon	5.05¢			5.05¢						(Worcester = 5.25¢)				
0.61 to 0.80 carbon	5.65¢			5.65¢						(Worcester = 5.85¢)				
0.81 to 1.05 carbon	7.15¢			7.15¢						(Worcester = 7.35¢)				
1.06 to 1.35 carbon	9.45¢			9.45¢						(Worcester = 9.65¢)				
MANUFACTURERS' WIRE ⁹														
Bright	3.55¢	3.55¢		3.55¢	3.55¢					(Worcester = 3.65¢, Duluth = 3.60¢)	4.56¢ ¹³	4.022¢	4.006¢	
Galvanized														
Spring (high carbon)	4.60¢	4.60¢		4.60¢						(Worcester = 4.70¢, Duluth = 4.85¢) (Trenton = 4.85¢)	5.737¢ ¹³	5.072¢	4.964¢	
PILING, Steel sheet	3.30¢	3.30¢				3.30¢							3.75¢	3.756¢

PRICES

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation		Subject to negotiation			
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	Subject to negotiation		Subject to negotiation			
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation		Subject to negotiation			
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt, Beth.	Subject to negotiation		Subject to negotiation			
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth, Brackenridge	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton, Brackenridge, Balt, Coatesville	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt, Brackenridge	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown, Balt, W. Leechburg	32.50	30.50	24.00	24.50	35.00	58.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton, W. Leechburg	32.48	30.30	23.80	24.34	34.82	58.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	28.75
Tubing, seamless, P'gh, Chi, Canton, Brackenridge, Milwaukee	72.09	72.09		68.49		

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	\$2.25
18	4	1	—	5	\$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢
High-carbon-chromium*					47¢
Oil hardening manganese*					26¢
Special carbon*					24¢
Extra carbon*					30¢
Regular carbon*					17¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Armature	4.80¢ to 5.05¢
Electrical	5.30¢ to 5.55¢
Motor	6.05¢ to 6.30¢
Dynamo	6.75¢ to 7.50¢
Transformer 72	7.25¢ to 8.25¢
Transformer 65	7.95¢ to 9.20¢
Transformer 58	8.65¢ to 9.90¢
Transformer 52	9.45¢ to 9.70¢

F.o.b. Chicago and Gary: armature through motor only. F.o.b. Granite City add to lower quotation 0.45¢ for armature through & 72, and 0.35¢ for balance.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb No. 1 O.H., per 100 lb	\$2.75
Angle splice bars, 100 lb (F.o.b. basing points)	3.85
Light rails (from billets)	\$3.10

Base per lb

Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.65¢
Tie plates, Pittsburgh, Calif.	3.80¢
Track bolts	7.00¢
Track bolts, heat treated, to railroads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, St. Louis, Kansas City, Minnequa, Colo.; Birmingham; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

8-lb coating I.C.	\$7.05	\$14.10
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CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	21.50	
Inconel-clad		
10 pct, f.o.b. Coatesville.	30.00	
Monel-clad		
10 pct, f.o.b. Coatesville.	24.00	
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh		9.00

*Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Birmingham

	Base Column San Francisco
Standard & coated nails*	94 115
Galvanized nails*	94 115
Woven wire fence†	100 123
Fence posts, carloadst††	105
Single loop bale ties	99 123
Galvanized barbed wire**	113 133
Twisted barbed wire	113

*Also Duluth; Worcester, 6 columns higher, † 15 1/2 gage and heavier. **On 80-rod spools, in carloads. †† Pittsburgh, Duluth only.

	Base per 100 lb	San Francisco
Annealed fence wire †	\$4.20	\$5.21
Annealed, galv. fencing †	4.65	5.66
Cut nails, carloads ††	6.30	

† Add 10¢ at Worcester. †† Pittsburgh only, less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dynalloy	Hi Steel	Mayari R	Otis-cloy	Yoloy	NAX High Tensile
Producer	Repub-lic	Carnegie-Illinois, Republic	Repub-lic	Alan Wood	Inland	Bethle-hem	Jones & Laughlin	Youngs-town Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30		5.30	5.30	5.30	5.30	5.30
Galvanized		6.00				6.00			
Strip									
Hot-rolled	4.30	4.30	4.30		4.30	4.30	4.30	4.30	4.30
Cold-rolled			5.30			5.30	5.30	5.30	5.30†
Shapes		4.30			4.30	4.30	4.30	4.30	
Beams		4.30				4.30			
Bars									
Hot-rolled	4.45	4.45	4.45			4.45	4.45	4.45	4.45
Bar shapes		4.45			4.45	4.45	4.45	4.45	

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PRICES

PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh and Lorain, steel butt weld and seamless. Others f.o.b. Pittsburgh only. Base price, \$200.00 per net ton

Standard, threaded & coupled

Steel, butt weld	Black	Galv.
1/2-in.	47	29 1/2
3/4-in.	50	33 1/2
1-in.	52 1/2	36 1/2
1 1/4-in.	53	37
1 1/2-in.	53 1/2	37 1/2
2-in.	54	38
2 1/2 and 3-in.	54 1/2	38 1/2

Wrought Iron, butt weld		
1/2-in.	+11	+35
3/4-in.	+1 1/2	+25
1 and 1 1/4-in.	4	+16 1/2
1 1/2-in.	9 1/2	+13
2-in.	10	+12 1/2

Steel, lap weld		
2-in.	44 1/2	28
2 1/2 and 3-in.	48 1/2	32
3 1/2 to 6-in.	50 1/2	34

Steel, seamless		
2-in.	43 1/2	27
2 1/2 and 3-in.	46 1/2	30
3 1/2 to 6-in.	48 1/2	32

Wrought Iron, lap weld		
2-in.	1 1/2	+20
2 1/2 to 3 1/2-in.	4	+16
4-in.	8	+10 1/2
4 1/2 to 8-in.	6	+12

Extra Strong, plain ends

Steel, butt weld		
1/2-in.	46	30
3/4-in.	50	34
1-in.	52	37
1 1/4-in.	52 1/2	37 1/2
1 1/2-in.	53	38
2-in.	53 1/2	38 1/2
2 1/2 and 3-in.	54	39

Wrought Iron, butt weld		
1/2-in.	+6 1/2	+29
3/4-in.	+1 1/2	+23
1 and 1 1/4-in.	4	+16 1/2
2-in.	10	+12 1/2

Steel, lap weld		
2-in.	43 1/2	28
2 1/2 and 3-in.	48 1/2	32
3 1/2 to 6-in.	52	36 1/2

Steel, seamless		
2-in.	42 1/2	27
2 1/2 and 3-in.	46 1/2	31
3 1/2 and 6-in.	50	34 1/2

Wrought Iron, lap weld		
2-in.	4 1/2	+16 1/2
2 1/2 to 4-in.	13	+6
4 1/2 to 6-in.	9	+10 1/2

Basing discounts for standard pipe are for threads and couplings. For threads only, butt weld, lap weld and seamless pipe, one point higher discount (lower price) applies. For plain ends, butt weld, lap weld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lap weld and seamless 3 1/2-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all butt weld. On butt weld and lap weld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft., f.o.b. Pittsburgh in carload lots, cut length 1/2 to 2 1/2 ft. inclusive.

OD in.	Gage	Seamless	Electric Weld
		Hot- Rolled	Cold- Rolled
2	13	\$17.84	\$20.99
2 1/2	12	23.99	28.21
3	12	26.68	31.40
3 1/2	11	33.35	39.26
4	10	41.40	48.70

CAST IRON WATER PIPE

	Per net ton
3-in. to 24-in. del'd Chicago	\$91.12
4-in. to 24-in. del'd New York	89.18
5-in. to 24-in., Birmingham	79.50
4-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	105.90
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.	

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Percent Off List
1/2 in. & smaller x 6 in. & shorter	45
9/16 & 5/8 in. x 6 in. & shorter	46
3/4 in. & larger x 6 in. & shorter	43
All diam. longer than 6 in.	41
Lag, all diam over 6 in. long	44
Lag, all diam x 6 in. & shorter	46
Plow bolts	54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)	
1/2 in. and smaller	43
9/16 to 1 in. inclusive	42
1 1/8 to 1 1/2 in. inclusive	40
1 1/2 in. and larger	35
On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.	

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller	46	
1/2 in. and smaller	44	
1/2 in. through 1 in.	44	
9/16 in. through 1 in.	43	
1 1/8 in. through 1 1/2 in.	41	42
1 1/2 in. and larger	35	

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate	65 and 10
In bulk	75
On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.	

Large Rivets

(1/2 in. and larger)	
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$5.65
F.o.b. Lebanon, Pa.	5.80

Small Rivets

(7/16 in. and smaller)	
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55

Cap and Set Screws

(In packages)	Percent Off List
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	53
3/4 to 1 in. x 6 in., SAE 1035, heat treated	44
Set screws, oval points	56
Milled studs	29
Flat head cap screws, listed sizes	16
Fillister head cap, listed sizes	37
Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.	

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF ₂ Content:	Base price per short ton
70% or more	\$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	\$5.95
Old range, nonbessemer	5.80
Mesabi, bessemer	5.70
Mesabi, nonbessemer	5.55
High phosphorus	5.55
Above prices were for 1947 season.	

METAL POWDER

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	24¢ to 28 1/2¢
Copper, electrolytic, 100 and 325 mesh	30 1/2¢ to 34 1/2¢
Copper, reduced, 150 and 200 mesh	30 1/2¢ to 32¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots	11.5¢ to 14.5¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8.5¢
Domestic sponge iron, minus 48 mesh	10¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	44¢
Iron, electrolytic, annealed, 100, minus 200 mesh	17¢ to 21¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	39 1/2¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to \$1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 29¢
Antimony, 100 mesh	44¢
Cadmium, 100 mesh	\$2.00
Chromium, 100 mesh and finer	\$1.025
Lead, 100, 200 & 300 mesh 20 1/2¢ to 25 1/2¢	
Manganese, minus 325 mesh and coarser	59¢
Nickel, 100 mesh	51 1/2¢
Silicon, 100 mesh	29¢
Solder powder, 100 mesh, 8 1/2¢ plus metal	
Stainless steel, 302, minus 100 mesh	75¢
Tin, 100 mesh	90¢
Tungsten metal powder, 98%-99%, any quantity, per lb.	\$2.90
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	\$2.65
Under 100 lb	\$2.90

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	\$12.00 to \$13.00
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	13.50 to 14.50
Foundry, Byproduct	
Chicago, del'd	\$18.60
Chicago, f.o.b.	17.50
New England, del'd	20.40
Seaboard, Kearney, N. J., f.o.b.	17.85
Philadelphia, f.o.b.	17.75
Swedeland, Pa., f.o.b.	17.75
Buffalo, del'd	20.15
Ashland, Ohio, f.o.b.	15.50
Painesville, Ohio, f.o.b.	16.60
Erle, del'd	19.95
Cleveland, del'd	17.90
Cincinnati, del'd	18.59
St. Louis, del'd	18.03
Birmingham, del'd	15.76

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	Carloads, Per 1000
No. 1 Ohio	\$67.00
First quality, Pa., Md., Ky., Mo., Ohio	73.00
First quality, New Jersey	78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio	67.00
Sec. quality, New Jersey	70.00
No. 2 Ohio	59.00
Ground fire clay, net ton, bulk	10.50
Silica Brick	
Pennsylvania and Birmingham	\$73.00
Chicago District and Alabama	82.00
Silica cement, net ton (Eastern)	12.50
East Chicago	13.50

Chrome Brick	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	\$64.00

Magnesite Brick	
Standard, Balt. and Chester	\$86.00
Chemically bonded, Baltimore	75.00

Grain Magnesite	std. 1/2-in. grains
Domestic, f.o.b. Balt. and Chester in bulk, fines removed	\$51.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	27.00
in sacks with fines	31.50

Dead Burned Dolomite	
F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk, Midwest, add 10¢ Missouri Valley, add 20¢	\$11.00

PRICES

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia.....	\$4.56	\$5.77	\$5.90	\$4.82	.....	\$4.85	\$4.57	\$4.87	\$5.75	\$8.47	\$8.77	\$10.30	\$10.45
New York.....	4.76	5.76 ¹	6.16	5.08	\$6.08	5.11	4.80	5.06	5.80	8.68	8.83	10.35	10.50
Boston.....	4.83	5.69	6.23 ¹²	5.61	6.87	5.18	4.91	5.04	5.88	8.99	9.14	10.43	10.58
Baltimore.....	4.32	.....	5.72	4.80	.....	4.77	4.71	4.85	5.71	.....	.....	.....	.....
Norfolk.....	4.90	.....	.....	5.30	.....	5.15	5.15	5.20	6.00	.....	.....	.....	.....
Chicago.....	4.25	5.10	5.65	4.35	5.45-6.65	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
Milwaukee.....	4.458	5.308	5.858	5.058	5.658	4.808	4.608	4.608	5.395	8.645	8.795	9.945	10.095
Cleveland.....	4.25	5.10 ¹	5.82	5.05	.....	4.60 ¹	4.70	4.40	5.10	8.61	8.76	9.50	9.65
Buffalo.....	4.25	5.10	6.03	5.23	5.72 ^s	4.98	4.40	4.40 ¹	5.10	8.20	8.35	9.50	9.65
Detroit.....	4.41	5.26	6.07	4.77	5.67	4.92 ¹	4.82	4.56-4.82	5.26	8.82	8.97	10.09	10.24
Cincinnati.....	4.56	5.22	5.77	4.77	.....	4.98	4.82	4.78	5.63	.....	.....	.....	.....
St. Louis.....	.....	6.22	.....	6.02	.....	4.91	.....	.....	5.67	8.72	9.07	10.22	10.37
Pittsburgh.....	4.25	5.10 ¹	5.65	4.35	.....	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
St. Paul.....	4.68	5.53	6.08	4.78	.....	5.03	4.83	4.83	6.00	.....	.....	.....	.....
Omaha.....	5.262	.....	6.712	5.362	.....	5.612	5.412	5.412	6.112	.....	.....	.....	.....
Indianapolis.....	4.59	5.36	5.91	4.69	5.79	4.94	4.74	4.74	5.44	.....	.....	.....	.....
Birmingham.....	4.45 ¹¹	.....	5.80	4.45 ¹¹	.....	4.65 ¹¹	4.40 ¹¹	4.40 ¹¹	6.13	.....	.....	.....	.....
Memphis.....	4.88 ¹¹	5.94 ¹	6.43	5.08 ¹¹	.....	5.23 ¹¹	5.03 ¹¹	5.03 ¹¹	5.94	.....	.....	.....	.....
New Orleans.....	*5.05 ¹¹	8.39 ¹	.....	5.25 ¹¹	.....	5.40 ¹¹	*5.10 ¹¹	*5.20 ¹¹	6.39 ^s	.....	.....	.....	.....
Houston.....	.....	.....	6.00	.....	.....	5.90	5.70	.....	.....	9.40	9.25	10.40	10.55
Los Angeles.....	5.75	.....	7.40	6.05	.....	5.55	5.35	5.50	7.35 ¹⁴	.....	.....	.....	.....
San Francisco.....	5.40 ^s	6.65	7.05	5.75 ^s	8.70	5.50	5.20	5.05	7.50	9.70 ¹⁵	9.55 ¹⁵	11.15 ¹⁵	11.30 ¹⁵
Seattle.....	5.45 ⁴	7.25 ⁴	6.85	5.60 ⁴	.....	5.60 ⁴	5.25 ⁴	5.45 ⁴	7.45 ¹⁴	8.95 ¹⁴	.....	.....	.....
Portland.....	5.30 ⁴	7.10 ⁴	6.70	5.60 ⁴	.....	5.45 ⁴	5.25 ⁴	5.55 ⁴	7.45 ¹⁴	.....	.....	.....	.....
Salt Lake City.....	6.40	.....	7.85	6.70	.....	6.20	6.35	6.55	7.55	.....	.....	.....	.....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb;

strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and

over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham

† Up to ¾ in. thick and 90 in. wide.

‡ Add 38¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT* PRICES						DELIVERED PRICES† (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Fondry	Malleable	Bessemer	Low. Phos.
Bethlehem	40.00	40.50	41.00	41.50	.....	Boston	Everett	\$0.50 Arb.	.....	45.50	46.00	.....	.....
Birmingham	38.88	36.38-39.38	.....	.....	.....	Boston	Steelton	5.78	45.78	.....	.....	.....	51.78
Buffalo	40.00-44.00*	40.00-44.50*	40.50-45.00*	.....	.....	Brooklyn	Bethlehem	3.60	43.60	44.10	44.60	45.10	.....
Chicago	38.50	39.00	39.50	40.00	.....	Cincinnati	Birmingham	5.85	44.73	42.23-45.23	.....	.....	.....
Cleveland	38.50	39.00	39.50	.....	.....	Jersey City	Bethlehem	2.21	42.21	42.71	43.21	43.71	.....
Erie	39.75*	40.25*	40.75*	.....	.....	Los Angeles	Provo	7.13	46.13	46.63	.....	.....	.....
Duluth	39.00	39.50	40.00	40.50	.....	Mansfield	Cleveland-Toledo	2.56	41.06-42.31*	41.56-42.81*	42.06-43.31*	42.56-43.81*	.....
Everett	38.50	39.00	39.50	40.00	.....	Philadelphia	Bethlehem	2.00	42.00	42.50	43.00	43.50	.....
Granite City	39.50	40.00	40.50	.....	.....	Philadelphia	Swedeland	1.21	46.21	46.71	47.21	47.71	.....
Neville Island	39.00	39.50	39.50	40.00	.....	Philadelphia	Steelton	2.59	42.59	43.09	43.59	44.09	48.59
Provo	39.00	39.50	.....	.....	.....	San Francisco	Provo	7.13	46.13	46.63	.....	.....	.....
Sharpville	39.00	39.50	39.50	40.00	.....	Seattle	Provo	7.13	46.13	46.63	.....	.....	.....
Steelton	40.00	.....	.....	.....	46.00	St. Louis	Granite City	0.75 Arb.	40.25	40.75	41.25	.....	.....
Struthers, Ohio	39.50	.....	.....	.....	.....				
Swedeland	45.00	45.50	46.00	46.50	.....							
Toledo	38.50	39.00	39.50	40.00	.....							
Troy, N. Y. ....	.....	.....	.....	.....	45.00								
Youngstown	39.00	39.50	39.50	40.00	.....							

* Republic Steel Corp. price. Basis: Average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00

pct. \$2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and \$1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—\$49.50; f.o.b. Buffalo—\$50.75. Add \$1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct

Mn over 1.00 pct. Add \$1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are \$1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus \$55.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, \$62.46. High phosphorus charcoal pig iron is not being produced.

FERROALLOY PRICES

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk) \$145
Less ton lots (packed) 189.00
Delivered Pittsburgh 151.00

\$1.80 for each 1% above 82% Mn; penalty, \$1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.70	8.95	9.50
Ton lots	10.30	10.90	12.80
Less ton lots	11.20	11.80	13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	\$51.00	\$52.00
F.o.b. Pittsburgh	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk 32
L.c.l. lots 34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads 32
Ton lots 34
Less ton lots 36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	23.00	24.85	26.05
0.10% max. C	22.50	24.35	25.55
0.15% max. C	22.00	23.85	25.05
0.30% max. C	21.50	23.35	24.55
0.50% max. C	21.00	22.85	24.05
0.75% max. C			
7.00% max. Si	18.00	19.85	21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload bulk 7.80
Ton lots 9.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet 3.75
Ton lots 10.35
Less ton lots 11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth \$78.00, foundry, \$79.00; \$78.75 f.o.b. Niagara Falls; \$77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	16.90	17.50	18.10
97% Si, 1% Fe	17.30	17.90	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	5.25	5.50	5.70
Ton lots	6.85	7.45	7.75
Less ton lots	7.75	8.35	8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50		
50% Si	9.30	9.80	10.00
75% Si	11.80	12.10	12.85
85% Si	13.30	13.60	14.35
90% Si	15.00	15.30	16.00

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	26.50	26.90	27.00
0.10% C	26.00	26.40	26.50
0.15% C	25.50	25.90	26.00
0.20% C	25.25	25.65	25.75
0.50% C	25.00	25.40	25.50
1.00% C	24.50	24.90	24.75
2.00% C	24.25	24.65	24.75

65-69% Cr, 4.9% C 18.60 19.00 19.15
62-66% Cr, 4-6% C 18.60 19.00 19.15

Briquets—Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	12.50	12.75	12.85
Ton lots	14.00	14.90	15.50
Less ton lots	14.90	15.80	16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	19.70	20.10	20.25
Ton lots	21.85	23.15	23.95
Less ton lots	23.35	24.65	25.45

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% mn, 1.25% max. C.

	Eastern	Central	Western
Carload	25.00	25.40	25.50
Ton lots	27.30	27.95	29.15
Less ton lots	29.10	29.75	30.95

Chromium Metal

Contract prices, cents per lb, chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	97.00	98.50	99.75
0.50% max. C	93.00	94.50	95.75
9.00% min. C	91.50	93.00	94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe
r 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	16.25	16.75	18.80
Ton lots	19.35	20.10	22.25
Less ton lots	20.85	21.60	23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.
Eastern Central Western
Carloads 17.50 18.00 20.05
Ton lots 19.80 20.65 22.40
Less ton lots 20.80 21.65 23.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	\$1.85	\$2.70	\$3.40
Less ton lots	2.20	3.05	4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	18.00	19.10	21.05
Less ton lots	19.25	20.35	22.30

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.75	16.85	18.80
Less ton lots	17.00	18.10	20.05

Other Ferroalloys

Ferrotungsten, standard, lump or ½ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed. . . \$2.25

Ferrovandium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

Openhearth \$2.90
Crucible 3.00
High speed steel (Primos) ... 2.10

Vanadium pentoxide, 88-92% V₂O₅ contract basis, per pound contained V₂ \$1.20

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb
Ton lots \$2.50
Less ton lots \$2.55

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo. 95¢

Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo. 80¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo. 80¢

Molybdenum oxide in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo. 80¢

Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti \$1.25

Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti \$1.35
Less ton lots \$1.40

High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton. . . \$142.50

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$3 unitage, per gross ton \$65.00
Less ton lots \$1.25

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
Carload lots 18.40¢

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy
Carload, bulk 6.00¢

Alsiifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.
Carload 6.90¢
Ton lots 7.40¢

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
Car lots 9.50¢
Ton lots 10.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.
Eastern Central Western
\$1.20 \$1.23 \$1.21

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern	Central	Western
Ton lots	\$1.89	\$1.903	\$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.
Less ton lots. \$1.80 \$1.8125 \$1.8445

Silicaz, contract basis, f.o.b. plant freight allowed, per pound.
Carload lots 39.00¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.
No. 1 93¢
No. 6 63¢
No. 79 45¢

Bortram, f.o.b. Niagara Falls
Ton lots, per pound 45¢
Less ton lots, per pound 50¢

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15-17%, B 0.90-1.15%, Si 2.5-3.0%, Al 1.0-2.0%.

Ton lots, per pound 8.0¢

Borossil, f.o.b. Philo, Ohio, freight allowed, B 3%-4%, Si 40%-45%, per lb contained B \$6.25

smooth, safe . . . air controlled operation

means . . . day-long efficiency

with the . . . **ORTON LOCOMOTIVE CRANE**

• Effortless, fingertip control of loads up to 500,000* pounds by the operator of an Orton Crane is just one of the many reasons why Orton has nearly 2,000 satisfied customers.

• Orton *air control* permits smooth, *tireless* operation of clutches. The man in the "driver's seat" retains early morning efficiency all day long.

• The Orton operator has many safety features upon which to rely. A completely automatic spring-applied air-released boom-hoist brake *positively prevents* dropping the boom. An air-controlled limit switch *makes impossible* pulling the boom over backwards.



• Every Orton Crane is built with anti-friction bearings on all power shafts . . . Gears and shafts remain in permanent, rigid alignment throughout the life of the crane . . . An independent transmission with built-in reverse, built by Orton for crane work only, makes possible lowering of heavy loads *against compression of the engine* . . . Single-point adjustment, burn-proof V-type "Orcoin" block clutches can not get out of round. Overheating cannot hurt them.

Send for Catalog No. 77 for full details and roster of Orton world-wide users.

* Note deep, short-coupled car body on Orton Model 150 Locomotive Crane, illustrated. Most rigid car body of any locomotive crane built. Operator has clear view of load and path of swing at all times.

ORTON

CRANE & SHOVEL COMPANY
608 South Dearborn Street, Chicago 5, Illinois



CONCO HANDLING EQUIPMENT



CONCO TYPE DM
OVERHEAD
ELECTRIC CRANE

● WRITE today for complete information on the CONCO line of hand-powered and electric cranes, hoists and trolleys — a complete line, tried and proven for over twenty years. CONCO engineers are qualified to recommend the right type of handling equipment for faster, more economical production in your shop. Write us now, and take advantage of our long experience in moving more materials, faster and at less cost.

CRANES • HOISTS • TROLLEYS



Division of
H. D. Conkey & Co.

CONCO ENGINEERING WORKS, 15 Grove St., MENDOTA, ILL.

TIME

Electro HIGH SPEED CUT-OFF WHEELS

Against Anything

Ferrous and non-ferrous metals—even ceramics—give way to the grinding cuts of Electro HIGH SPEED CUT-OFF WHEELS and partition time drops from minutes to *seconds*. No other method, no other tool, equals Electro HIGH SPEED CUT-OFF WHEELS for speed, safety, metal saving.



Send for Grinding Wheel Manual 645 in full color. It's free and completely informing.

Service from Los Angeles or Buffalo



Electro REFRACTORIES & ALLOYS CORPORATION
MFRS. • REFRACTORIES • High Speed • CRUCIBLES • ALLOYS
344 DELAWARE AVENUE (GRINDING WHEELS) BUFFALO 2, NEW YORK

PERSONALS

CONTINUED FROM P. 112

● **John H. Tipton** has been appointed assistant district manager of the Cincinnati office of SKF Industries, Inc., Philadelphia. **M. H. Courtenay** has been made assistant district manager of the Atlanta office; and **E. A. Hutson**, field engineer in the railway sales department of the Chicago office. Mr. Tipton joined SKF in 1936 and has been a field engineer in the Cincinnati office since 1943. Mr. Courtenay, with the firm more than 20 years, served as field engineer in the Atlanta office. Mr. Hutson joined SKF in 1942.

● **Herbert L. Piasecki**, office manager, has been appointed to the position of assistant treasurer of Stearns Magnetic Mfg. Co., Milwaukee. **A. B. Paape** has been made assistant secretary.

● **John W. Waldron** has been appointed consumer products sales manager of Hungerford Plastics Corp., Murray Hill, N. J. He was formerly one of the corporation's development engineers.

● **Everett Morss**, president of the Simplex Wire & Cable Co., has been elected to the board of directors of Arthur D. Little, Inc., Cambridge, Mass.

● **Edwin A. Hamala** has joined the staff of Jack & Heintz Precision Industries, Inc., Cleveland, as advertising and sales promotion manager. Mr. Hamala directed all advertising and sales promotion activities for the General Electric Co.'s premier vacuum cleaner division from 1939 until recently, with the exception only of a military leave of absence.

● **John Shotwell**, former secretary-treasurer of the United Aircraft Products Co., and at one time a director and treasurer of Willys-Overland, has been named general manager of the Sterling Engine Co. of Buffalo.

● **Glen Petersimes** has been appointed superintendent of manufacturing services of Lincoln-Mercury Div., Ford Motor Co., Detroit. He has been engaged in the automotive industry since 1914 and has

PERSONALS

previously worked for Lincoln and Chrysler.

● **Frank D. Lindquist** has been made general superintendent of Crompton & Knowles Loom Works, Worcester. He joined the company in 1919.

● **Robert J. Wilson**, general manager of Western Specialty Co., Milwaukee, has been appointed a vice-president of the firm.

● **P. G. Little**, who has been with the Nash Motors Div. of Nash-Kelvinator Corp., Kenosha, Wis., for 32 years, has been named acting general works manager of the division, succeeding the late Harold E. Long.

● **Dr. James E. Gates** has joined the consulting staff of Container Laboratories, Inc., Chicago. He was formerly assistant to the director of the containers division of the War Production Board, and later consulting economist to the Container Corp. of America.

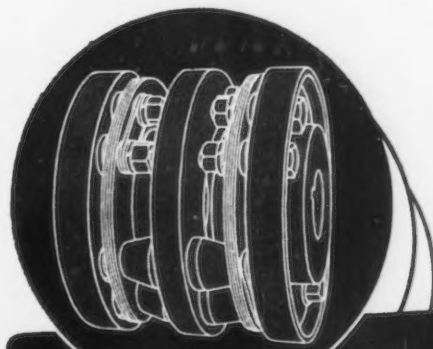
● **C. D. Alderman** has been named sales manager of Mullins Mfg. Corp.'s Youngstown kitchen division in Warren, Ohio. He succeeds **Frank W. Knecht, Jr.**, who has been promoted to staff assistant. **David F. Rucks, Jr.** moves up from regional manager to assistant manager of sales, Mr. Alderman's former position.

● **Andrew Westhead** has been appointed district sales manager of the New England district for General Electric Co.'s chemical department with headquarters in Boston. He was formerly in charge of the department's Springfield, Mass. sales office. **William B. Frackleton** has been made district sales manager of the central district of the chemical department with headquarters in Chicago.

● **H. E. Cable** has been appointed district manager of the Pittsburgh office, Lincoln Electric Co. Mr. Cable came to Lincoln Electric in 1943 and has been active since then as a welding engineer in the Pittsburgh area. **J. S. Roscoe** has been made district manager for the Chicago office. Mr. Roscoe comes to Chicago from Pittsburgh where he has been district manager since 1944.

THOMAS *flexible* COUPLINGS

.... are specified by engineers, wherever
100% Operating Efficiency is demanded

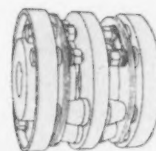


THOMAS *flexible* COUPLINGS

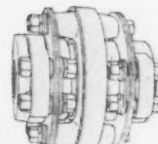
provide for
Angular and Parallel
Misalignment as well
as Free End Float...

and Eliminate
**BACKLASH, FRICTION,
WEAR and CROSS-PULL**

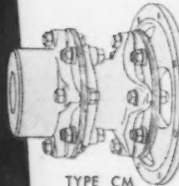
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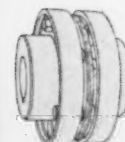
TYPE DBZ



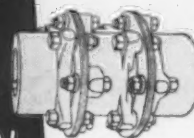
TYPE DSM



TYPE CM



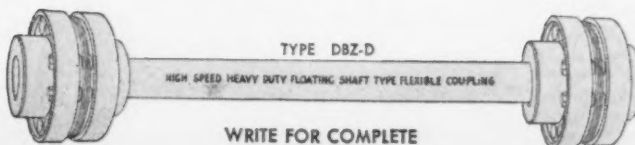
TYPE ST



TYPE AM



TYPE SS



TYPE DBZ-D

HIGH SPEED HEAVY DUTY FLOATING SHAFT TYPE FLEXIBLE COUPLING

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THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA



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In Gary, Indiana, you're not allowed to ride on a streetcar within four hours after eating garlic.

IT'S THE LAW COMPANY in Youngstown, Ohio, that installs hard-surface floors and all types of industrial flooring to meet your regular and special needs. Our hard-surface floors include SILICRETE, and FLINT-ROC (flint fines and aggregate). One of these special floors might make your plant more efficient:

MASTIC FLOORS—Heavy-duty rolling aisles.

HUBBELLITE—For improved sanitary conditions. Used in industrial shower rooms, dairies, food processing plants, etc.

STATIC CONDUCTING FLOORS—For use in the ordnance industry, and in hospital operating rooms.

HEAT-RESISTANT FLOORS—Pre-cast with high temperature cement and aggregate, with integral reinforcing mesh.

CORDED RUBBER—To soundproof rolling aisles, and for light assembly plants.

The Law Company specializes in floor work exclusively... hard-surface flooring and industrial floors of all types. Call or write today for a free estimate for your plant or building.

THE F. IVAN LAW COMPANY
3311 GLENWOOD AVENUE YOUNGSTOWN 7, OHIO

Invitation TO A FRESH START



Cool, clear water that sparkles upward in a smooth, splash-free flow—that's the sure way to a *fresh start* for thirsty people everywhere. It's the healthful, satisfying answer to thirst-fatigue. That's why it is important to see that properly cooled drinking water is convenient to everyone, at all times. Install Electric Water Coolers at strategic points throughout your plant and offices—where every employee will be reminded to get a fresh start before thirst takes its toll. It pays!

COOLING
CURE FOR
THIRSTY
THROGS

Write today for full information on today's Kelvinator-refrigerated Electric Water Coolers! There are models and sizes for every requirement.

The EBCO Manufacturing Co.,
Town and Lucas Sts. Columbus 8, Ohio

PERSONALS

● **Blair Glenn**, general superintendent of the Canton Bearing Div. of the Timken Roller Bearing Co., Canton, Ohio, has been promoted to assistant factory manager of the Canton Bearing Div. **Henry Tobey**, Canton Bearing factory metallurgist, has been appointed general superintendent of the Canton Bearing factory succeeding Mr. Glenn.

● **Fred Barnard**, assistant Canton Bearing factory metallurgist, has been appointed Canton Bearing factory metallurgist succeeding Mr. Tobey. **Joseph Selby** has been appointed assistant Canton Bearing factory metallurgist succeeding Mr. Barnard. **Russell P. Fowler**, assistant general superintendent of the Columbus plant, has been appointed superintendent of the Bucyrus Bearing factory, where operations are scheduled to begin early this spring.

● **Richard M. Paxton, Jr.** has been added to the sales organization of Edgcomb Steel Corp. of Hillside, N.J. Mr. Paxton has for many years been associated in the New York Metropolitan area as a sales executive for the Jessop Steel Co.

● **W. E. Byrne** has been appointed district sales manager for the Detroit area of Simonds Abrasive Co. in addition to his similar capacity for the Chicago territory. He will continue to be located in Chicago.

● **Harry F. Pugh**, formerly assistant to the president of the Hell Co., Milwaukee, has been appointed vice-president in charge of sales and advertising. **Arnold F. Meyer**, formerly chief engineer, has been appointed vice-president in charge of engineering; **Joseph J. Rosecky**, formerly works manager, is vice-president in charge of manufacturing; **J. F. Horn**, formerly controller, has been made controller, assistant secretary and treasurer; **Allen E. Magee**, formerly company attorney, has been appointed assistant secretary; **William E. Simmons**, formerly a divisional manager, is now general sales manager; **E. G. Gilmore** has been made assistant treasurer, and **Edward Fellows, Jr.**, formerly purchasing agent, has been appointed director of purchases.

● **Andrew W. Engel** has been appointed to the position of pur-

PERSONALS

chasing agent of Ace Mfg. Corp., Philadelphia.

● **Mack V. Phillips** has been appointed sales manager of the commercial division of Bruce Fox Wrought Metals, Inc., New Albany, Ind. Mr. Phillips was formerly an industrial engineer with du Pont.

● **Louis X. Ely** has assumed the position of consultant to the Monessen Foundry Div. of Rockwell Mfg. Co., Monessen, Pa. Mr. Ely was the owner of Monessen Foundry & Machine Co. which was organized in 1905. When his foundry became a division of Rockwell in 1945, he consented to remain as general manager. **C. H. Daugherty**, formerly Mr. Ely's assistant, now assumes the duties of general manager of the Monessen Foundry Div.

● **Irving Pirofsky** has been appointed market research manager of the Daystrom Corp., Olean, N. Y., a subsidiary of ATF Inc. Mr. Pirofsky had been assistant to the ATF vice-president in charge of planning at the time he joined the Daystrom Corp.

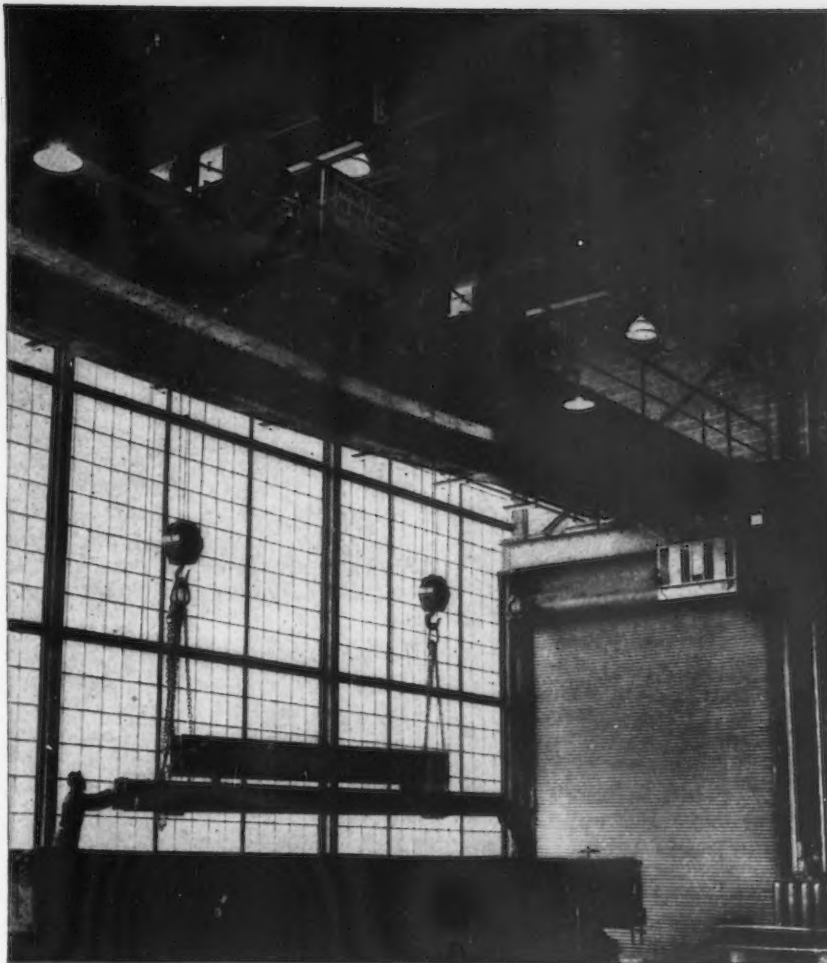
● **John J. Risko** has been appointed assistant sales manager of the Hendrick Mfg. Co. of Carbon-dale, Pa. For 6 years he was manager of the sales order department of the S.A.E. Steels Co. and later was a salesman for the Columbia Tool Steel Co., leaving the latter position to join the Hendrick organization.

● **John S. Madden** has been added to the staff of the G. A. Gray Co. of Cincinnati in the capacity of sales engineer and assistant electrical engineer. He spent nearly 14 years with Westinghouse as a sales engineer.

● **George Stout**, sales promotion manager of the Perfect Circle Corp., Hagerstown, Ind., has resigned.

● **John S. Godley** has been appointed sales representative of the Nelson Sales Corp., Lorain, Ohio. Mr. Godley, formerly in the company's Detroit office, will serve the Washington area. **R. E. McGinnis** has been appointed to fill the Detroit vacancy, with his headquarters in Toledo. Mr. McGinnis was formerly service engineer in the New York and Philadelphia area.

● **Dr. H. B. Osborn, Jr.** has been appointed to the post of technical



To cut Costs where costs start

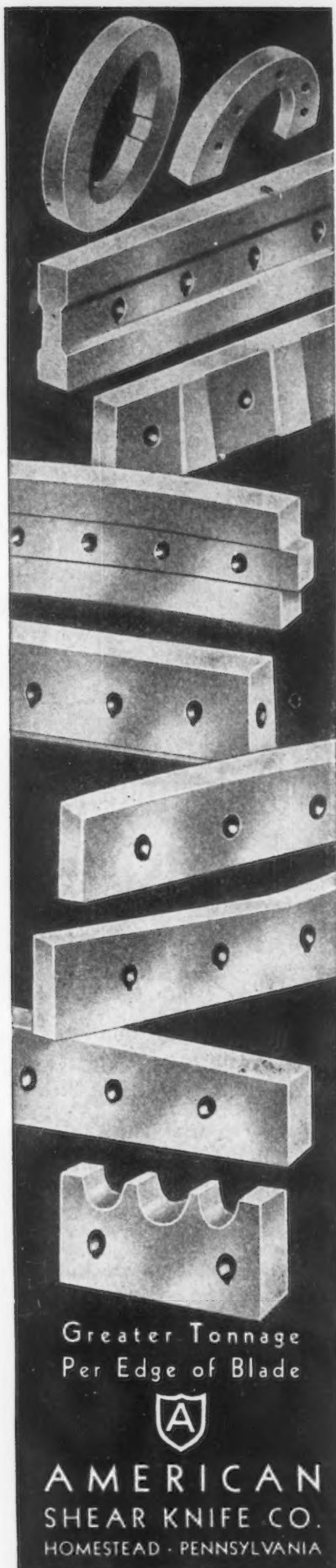
NORTHERN OVERHEAD ELECTRIC CRANES

When that hard-to-get, high priced material finally reaches your plant a NORTHERN OVERHEAD ELECTRIC CRANE will start cutting costs in your Receiving Department—by giving material flow a fast start to Processing—setting the pace which adds up to better teamwork, faster production, and faster inventory turnover.

It means quicker release of overtaxed rolling stock.

★ Let us send you Bulletin No. 117-C ★

OVERHEAD ★ NORTHERN
ELECTRIC CRANES ★ ENGINEERING WORKS
AND HOISTS ★ 2615 Atwater St., Detroit 7, Mich.



Greater Tonnage
Per Edge of Blade

AMERICAN
SHEAR KNIFE CO.
HOMESTEAD · PENNSYLVANIA

director of the Ohio Crankshaft Co's TOCCO Div., Cleveland. Dr. Osborn came to Ohio Crankshaft in 1940 as research and development engineer and in 1946 was named sales manager of the TOCCO Div.

● **N. P. Jacoby** has joined the sales engineering staff of Ash Engineering Co., Philadelphia representatives of Hagan Corp., Pittsburgh. **Gordon Stables** and **Richard Little** have joined the Ash service staff.

● **Jay M. Powers** has been appointed assistant director of purchases for Geuder, Paeschke & Frey Co., Milwaukee. Mr. Powers has been with Geuder, Paeschke & Frey for 6½ years.

● **Charles F. Keyser, Jr.** has been appointed manager of distributor sales for Shakeproof, Inc., Chicago. Mr. Keyser has been associated with Shakeproof in various sales and advertising capacities since 1937.

● **Thomas H. Appleton**, formerly district sales engineer for Link-Belt Co., Baltimore, has been appointed district sales manager in charge of the company's new office at Charlotte, N. C.

● **Norman B. Johnson**, assistant executive vice-president of Pullman-Standard Car Mfg. Co., has been named to head all operating activities at the Pullman Car works, Chicago passenger car division of the company.

● **J. B. Williams**, president and treasurer of the Cheney-Bigelow Wire Co., has been made a director of J. B. Williams Co., Glastonbury, Conn.

● **John W. Craig** has been promoted to general works manager of Crosley Div., Avco Mfg. Corp., Cincinnati. Since 1945 Mr. Craig has been works manager of the Crosley Shelvador refrigerator plant in Richmond, Ind.

● **O. B. Wilson** has been named industrial manager for the eastern sales region of the Brown Instrument Div. of Minneapolis-Honeywell Regulator Co. He will continue to make his headquarters in New York where he has been the Brown manager for the past 2 years.

GET LONGER LIFE AND GREATER EFFICIENCY WITH BOTWINIK NEW • USED • REBUILT MACHINE TOOLS

LATHES

1—Bridgeford 36" x 56", 15 speed, grd. hed., Eng. Lathe, M.D. AC elect. equip. power rap. trav. to carr., compound rest, 2 steady rests, sw. 38" over bed, 26" over carr., dist. betw. cens. 48", mtzd. apron and taper attrms.

BORING MILLS

Bullard 100" motor driven, rap. prod. Vert. Bar. Mill, capa. 102" in diam., 84" in hght., tabl. 92", wght approx. 80,000 lbs.

PLANERS

1—Putnam 84" x 84" x 40' Dbl. Hous. Planer, Revers, M.D. and controls, 2 heds on cross rail, 2 side heds., just taken out of service.

VERT. MILLER

Cin. 28" x 60" Vert. Hydro-Tel Milling Machine, very latest type, tbl. wkg. surf. 28" x 83", range: long. 60", cross 24", vert. trav. of spin. hed. 14"; power rapid trav.

PLAIN HOR. MILLERS

1—Cin. #5 Plain Hor. Mill. Mach., rect. overarm High Power Miller tbl. wkg. surf. 79" x 21" power long. feed 50", cross 14", vert. 21", B. & S. #2 light type, Pl. Horiz. Miller, Serial No. 4197, very latest type; tbl. wkg. surf. 45" x 10" all power feeds, long. 28" cross 10" vert. 15" spindle speeds 40-1300 RPM.
1—Farquhar 100 Ton Hyd. Press, daylight 48", stroke 36", approach and return speed 1600' per min., given maximum variation 5 degrees, wght. 44,000 lbs., elect. equip. 440/3/60, condition equal to new.

SHAPERS

Fellows #61A Gear Shaper (rebuilt in 1945) motor in base; will cut external gears 5" face ¾ D.P., 18"; internal gears 3" face ¾ D.P., 18".

HAMMERS

Chambersburg "Coccolloy," Mod. J2, 5000 lb. Board Drop Hammer, motor driven, new in 1944.

CHUCKING MACHINE

2—Potter & Johnson Auto. Chuck. Machine No. 6DRE, sw. over bed way 34", sw. over cross slide 21" diam., total turret slide travel 18", with tooling, M.D.

GRINDER

Campbell #302 Hydraulic Abrasive Cutting Machine, late type; wheel trav. 22", clearance from top of tbl. to bottom of 16" wheel—9".

SCREW MACHINE

B. & S. #2 Hand Screw Mach., power feed to turret turns any length to 6" whole thru longest regular feeding finger 1" — thru spindle 1-9/16", spdl. speeds 580-2485 RPM, latest type.

MISCELLANEOUS

P. & W. #BL Model 2416, Keller Duplicating Machine, tbl. wkg. surf. 42" x 22", tbl. trav. horiz. 24", vert. 16", trans. 8"—very late type—3 dimension complete with angle plates control cabinet.

Complete Your Machine Tool
Files, Write, Wire or Phone

Botwinik Brothers

OF MASS., INC.

5 SHERMAN ST., WORCESTER 1, MASS.

PERSONALS

• **L. R. Emmert** has been appointed manager of rural electrification, Westinghouse Electric Corp., Pittsburgh. Mr. Emmert joined Westinghouse in 1936 and has been in the Philadelphia and Washington offices. He succeeds **N. H. Callard**, who has accepted a position with the Hilo Electric Light Co. of Hilo, Hawaii.

• **Alvin B. Geddes**, sales representative in the Calgary, Alberta area, has been appointed district manager in Canada for the National Supply Co., Ltd., with district headquarters at Calgary. Mr. Geddes joined National Supply in 1943.

• **Thomas A. White** has been made manager of the San Francisco zone of the Pontiac Motor Div. of General Motors Corp. Most recently manager of the Omaha zone, Mr. White succeeds **Rocco J. Cutri**, who has been appointed manager of the Los Angeles zone. Mr. Cutri succeeds **K. D. Clark**, who has resigned to take a Pontiac dealership in Los Angeles. **Don R. Stuart** has been appointed manager of the Omaha zone, succeeding Mr. White. Mr. Stuart's most recent position was as assistant manager of the Pontiac zone office.

• **A. P. Ford** has been appointed supervisor of stations, Chicago Great Western Ry. Co., Chicago.

• **Crawford H. Greenewalt** has been made president of E. I. du Pont de Nemours & Co., Wilmington, Del. **Walter S. Carpenter, Jr.** has been elected chairman of the board. Mr. Carpenter's resignation as president and his election as chairman of the board followed the retirement of **Lamot du Pont** from the latter post. Mr. du Pont's career with the company began in 1902. Mr. Greenewalt also becomes chairman of the executive committee, of which he had previously been vice-chairman and a member of the finance committee. Mr. du Pont will continue as a member of the board, while Mr. Carpenter retains his membership on the finance committee. **Walter J. Beadle**, a vice-president and member of the board, has resigned as treasurer of the company and has been elected to membership on the executive committee. **T. C. Davis**, who had been first assistant treasurer, has been elected treasurer to replace Mr. Beadle.

How to catch **DIMENSIONAL ERRORS** **BEFORE THEY OCCUR...**

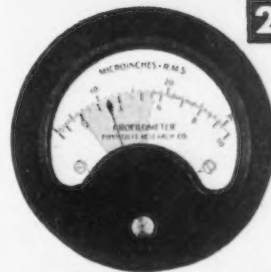
With Tremendous Savings in Time and Cost

This new technique of quality control offers tremendous savings wherever parts are produced in quantity by machining operations—for it gives positive warning of impending dimensional changes *before they take place!*

Change in surface roughness is the clue, since it directly indicates the dulling of cutting tools or grinding wheels which results in dimensional errors. The **start** of defective cutting action is shown by an **increase in surface roughness**, and is quickly determined as follows:



1 Take Profilometer readings of finished pieces, and note the roughness readings along the length of the work area. These readings are made **right on the production line**, or even in the machine—and **without cooling the work** as required for precision gaging.



2 When the **range** of roughness starts to increase (as shown directly on the meter dial in microinches), you know that the tool or grinding wheel is starting to become dull, and that dimensional errors will soon follow because of defective cutting action.



3 Shortly thereafter, when the **average** roughness begins to increase, as well as the range, you know that the work will no longer be within required dimensional limits.

This simple procedure enables you to **prevent errors before they occur**—and it can be applied to practically any surface that can be produced by normal machining and grinding methods. The initial cost of the Profilometer is soon repaid by resulting savings in production time and elimination of rejects.

May we send you descriptive literature?



The PROFILOMETER
TRADE NAME REGISTERED

PHYSICISTS RESEARCH COMPANY

ANN ARBOR

MICHIGAN

Titanium Promising For Atomic Construction Steel Use Seen Unlikely

Washington

• • • Steel may give way to titanium in the construction of atomic power plants.

"Steel does not look suitable for this purpose," Sumner Pike, member of the Atomic Energy Commission, told a group of industrialists last week. (March 18). Titanium, he pointed out, "has a strength-weight ratio considerably better than good structural steel."

Mr. Pike told members of the National Industrial Conference Board that AEC temperatures of 1000 to 1500 degrees centigrade are what scientists are "shooting for" in atomic power plant experiments at Brookhaven, Long Island.

"We have on our hands a metallurgical problem which calls for a metal of good structural strength equivalent to or better than steel which will stand considerably higher temperatures than conventional steel, which in addition will not absorb too many neutrons and thus slow down or stop the reaction," Mr. Pike stated.

AEC, he added, is considering titanium as a "possible candidate" to replace steel in atomic power plant experiments. Titanium is plentiful but is in "about the same state that aluminum was 80 or 90 years ago."

"If titanium turns out to have the qualities that we want," he predicted, "there is no immediately obvious reason why it can't be produced in large quantities and at quite low cost per pound."

Heavy shielding required for protection against health hazards seem to eliminate use of atomic power for small mobile units, Mr. Pike said. But in the case of large central power plants and ship propulsion atomic energy may "come into direct competition with present sources of power" in 5 to 15 years, he added.

"We do not know enough about any of the major elements of cost to be able to say flatly whether it will or will not compete with present sources of power. But, from the little we do know and what we can infer, we believe that it can fit, first in places where power costs are a minor factor, and where present power costs are very high.



Alarm clock, electric razor, telephone, automobile, typewriter, calculator, switches and electric motors, pruning shears, push button radio controls and . . . yes, the juke box—the list goes on and on . . . all function because of dependable wire springs—JOHNSON XLO Music Spring Wire, the wire of a thousand uses, made under strict laboratory control all the way from mine to you.

JOHNSON

STEEL AND WIRE COMPANY, INC.
WORCESTER 1, MASS.

New York Philadelphia Cleveland Detroit Akron Chicago
Atlanta Houston Tulsa Los Angeles Toronto

STOP WASTING DOLLARS

ON OBSOLETE MATERIALS-HANDLING METHODS

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USERS: Chrysler, US Steel, DuPont, Lima Locomotive, Basic Magnesium, Pullman-Standard, Boeing, Lockheed, Ford, Bethlehem, General Motors, etc.



1½, 2½, 5 & 10 Ton Capacities

Silent Hoist & Crane Co.

851 63rd ST., BKLYN. 20, N. Y.

MODERNIZE! You can offset rising costs with **KRANE KAR**, a power-swinging boom Crane that is small, compact, will travel to any part of yard or plant. Loads and Unloads freight cars, trucks, trailers . . . Tiers and Stores . . . ideal for Maintenance and Repairs. **KRANE KAR** will transport any load it can lift and with its power-swinging, power-topping features spot the load with fine precision at destination. **KRANE KAR** does the work of 6 or 8 men, handling materials at cost of 8c a ton (case histories on request).

Pneumatic or solid rubber tires; 9 to 37 ft. booms or adjustable telescopic booms; gasoline or Diesel. Electric magnet, clamshell bucket, and other accessories available. Ask for Bulletin #69.

Kaiser-Frazer Is Making Tire and Engine Changes

Detroit

• • • Kaiser-Frazer is making 35 mechanical and body styling changes in its 1948 models recently announced.

Included in the changes are new low-pressure super cushion tires and an engine change which gives Kaiser-Frazer the highest compression ratio in the industry. The compression ratio is increased from 6.86 to 7.30 by the use of a special high-compression head.

Other changes include heavier shock absorbers and springs; a new triple-tooth roller gear for improved steering control; relocation of the fuel pump and exhaust outlet to prevent vapor lock, and the use of an aluminum master brake cylinder to replace the cast iron unit.

According to a company spokesman, plans to introduce an aluminum gas tank on the Kaiser-Frazer have been temporarily delayed. The new super-cushion tires will be 15 x 7.10 and will carry 24 lb. of pressure.

At the present time production rate at the Willow Run plant is approximately 750 per day. The company is making about 75 pct of its engines at its Detroit engine division. During the past few weeks a considerable amount of new equipment has been installed at the Detroit engine plant and the assembly line has been moved.

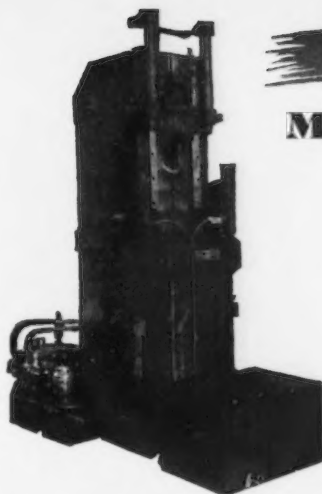
Kaiser-Frazer has also been conducting an intensive foremen training program.

Scrap Commission Formed

London

• • • Following a spate of publicity in the newspapers here on the effects of an imminent scrap shortage on British steel production, a three man commission has been appointed to study the problem. The group is now in Germany studying the position there.

Average weekly collection of scrap in the United Kingdom in January was 82,000 tons, compared with 67,000 tons in January last year. There are indications that this upward curve will continue, but the long-term aspect is serious. The government is studying a program of expanded shipbreaking, but if successful, it can furnish only a small part of the requirement



MEMO

to users of metal working equipment...

The new features recently installed on all Ruthman Gusher Coolant Pumps increases efficiency, prolong life expectancy, and reduce maintenance cost.

RUTHMAN GUSHER COOLANT PUMPS

Illustrated is an Oilgear Type XP Vertical Broaching Machine equipped with a 1/2 HP Model TL-7320 Gusher Coolant Pump.

New type end-bell on totally enclosed motor has built-in conduit box with ample capacity to accommodate the multiple lead wires of dual voltage staters. Concealed through-bolts fastened from inside of upper end-bell give drip-proof construction and improved appearance. Over-sized pre-lubricated ball bearings eliminate oilers or grease fittings.

Molten Metal Pumps

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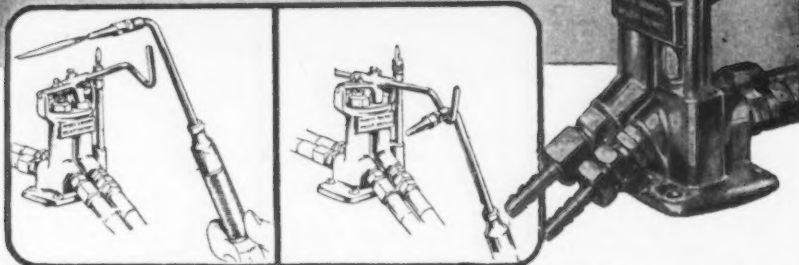
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148—THE IRON AGE, APRIL 1, 1948

NEWS OF INDUSTRY

Economic Survey Sees Raw Materials Problem Threatening Industry

London

● ● ● The government's Economic Survey for 1948 stresses on the part to be played by the steel industry, and gives a new general export target of 150 pct of 1938 volume to be reached by the end of this year, in place of the earlier figure of 160 pct. Reasons for the revision are given as (1) saturation of certain overseas markets (2) restrictions on imports due to dollar shortage (3) insufficiency of steel to meet all export needs.

Throughout the engineering industries levels of output will be dictated very largely by steel supplies. It is, as far as can now be seen, impossible to find enough steel to provide simultaneously for the full attainment of export targets, for agricultural expansion, for the needs of the mines, for expanded oil production and refining, for an absolute minimum of new factory construction and new industrial equipment, for the prevention of further deterioration of the railways, for the construction of new ships made imperative by the need to save dollars expenditure, and for a minimum scale of other uses.

The expansion of the engineering industries, which from a long-term point of view is almost certainly necessary, has reduced the available steel per head in those industries well below the pre-war level, and an inevitable consequence has been interruptions to the flow of production through shortages of materials.

The planned expansion of steel capacity will only begin to show significant results in two or three years' time. The pre-war scale of steel imports cannot be obtained for the time being, though every effort will be made to secure the greatest amount possible.

Other limitations are shortages of certain basic raw materials, such as chemicals like sulphuric acid, caustic soda and soda ash. There are shortages of a number of important engineering components, such as electric motors and ball-bearings. Each of these seriously

NEWS OF INDUSTRY

affects production in one or more industries.

Recent high levels of steel output in excess of the target rate have been achieved in what is always a good period of steel production and at the cost of continuous and ominous falls in the stock levels of pig iron, scrap and semi-finished steel. If the industry is to produce 14 million ingot tons this year, it will be necessary for it to operate at certain periods of the year at levels substantially in excess of that rate—say, 14½ or even 15 million tons.

The limiting factors will be scrap availability, blast furnace capacity, fuel and transport. The supplies of limestone and refractories will also need to be watched carefully.

Stocks of scrap are being rapidly used up to maintain the current high rates of steel production, and have fallen to little more than two weeks' consumption. Required imports of scrap for steel making are put at a minimum of 850,000 tons, but if more than this can be obtained it could be used by the industry and relieve pressure on pig iron supplies.

There is now no significant source of supply in sight other than Germany. Negotiations are going forward to secure up to one million tons of scrap this year from this source. But they are not yet completed, and the collection and transport of such a quantity will be a formidable task. On the basis of 59 pct scrap usage, the pig iron requirement for steel making will be 7.1 million tons, to which a further 2.1 million tons has to be added to meet the needs of the iron foundries and the refined and wrought iron works.

Attainment of the 14 million ingot tons target for 1948 is not assured. Though within the physical capacity of the industry, it could be placed in jeopardy by failure to resolve the potential bottlenecks of scrap, pig iron, coke and transport.

Finishing capacity is estimated at 16.75 million tons in 1948, so that, even if the target for home production of ingot were achieved, there would still remain a gap of 2.75 million ingot tons which could only be filled by imports. Great difficulties have been encountered in securing imports of steel, and there is no prospect of Britain's meeting her full needs. She may not get as much as 700,000 tons

For the purpose of planning the level of activity in the steel-using

48 ton, 15 inch thick ingot mold cut in 96 minutes

A prominent iron works in the Pacific Northwest had to reduce a 48 ton, cast iron, ingot mold to charging box size. Location of the casting required that it be halved where it lay and then trucked to the scrap yard.



L. R. Hayward, Airco Technical Sales Representative, suggested cutting with an Airco Radiagraph, equipped with a water cooled torch. A 2½ inch square billet, to be used as a waster, was placed the length of the 12 foot casting and the Radiagraph set for a forward speed of

1½" per minute. Fire clay was packed on both sides of the billet to keep the molten steel in the kerf. The oxyacetylene flame slashed thru the 15" thick casting and the 2½" waster at a speed that required only 96 minutes to make the 12 foot long cut.

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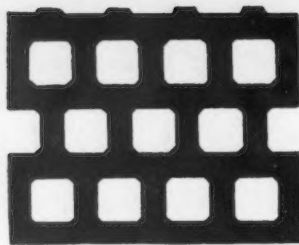
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NEWS OF INDUSTRY

industries in 1948, it would be unwise to count on deliveries of finished steel from all sources—home production, imports and recoveries of usable steel—of more than 2.6 million tons in the first quarter rising to 2.7 million tons in the second and third quarters and 2.8 million tons in the last. The average for the last two quarters of 1947 was a little over 2.5 million tons.

The new export targets require an increase of about 17 pct in engineering exports over those of the second half of 1947 by the end of 1948. Demands for direct exports of steel are increasingly clamant, and if Britain does not meet them, she will not secure the imports wanted in bilateral bargaining. The new agricultural program requires increased supplies of steel both for agricultural machinery and buildings. The needs of the coal mines, of the new steel works and of the oil refineries are increasing.

Auto Engineers to Meet

Toledo

● ● ● A regional meeting of automotive engineers in the Detroit-Toledo area will be held on Mar. 29. More than 500 industrialists, engineers and technical specialists are expected to gather at the Commodore Perry Hotel for a meeting sponsored by the Detroit section of the Society of Automotive Engineers and the Toledo Technical Council.

C. S. McIntyre, vice-president of the Monroe Auto Equipment Co., Monroe, Mich., will head the group arrangements for the Toledo meeting. Arthur H. Motley, president and publisher of *Parade* is the principal speaker.

Tube Prices Reduced

London

● ● ● Tube Investments Ltd., has cut the price of all its electrically welded tubes, and all components and products made from them, by 2½ pct. on all supplies despatched on and after March 15. The prices of these products have not been increased since August, 1946, in spite of increases in the cost of production which have taken place, including rises in the cost of steel. The decision is in line with the Government's appeal to reduce prices wherever possible.

NEWS OF INDUSTRY

General Motors Sales Hits Peacetime Peak

Detroit

• • • Net sales of General Motors hit a peacetime record level of \$3,815,159,163 according to the 1947 annual report. Net income to holders of common stock was \$275,063,063, equivalent to \$6.24 per share. During 1946 GM's earnings per share were equivalent to \$1.76.

The report pointed out that sales of replacement parts and aggregate sales of GM diesel locomotives, GM diesel engines, frigidaire and other non-automotive products represented a higher proportion of total volume than prewar years.

GM's share of new passenger car sales in 1947 was 40 pct compared with 38 pct in 1946 and 44 pct 1937-1941 period.

"Before the war a company's share of the market depended on customer preference," the report said. "In 1947 it depended to a great degree on the amount of materials a company could obtain, since many customers bought the cars on which they could get quickest delivery."

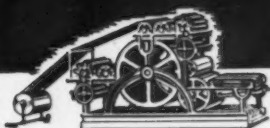
New Forging Council to Represent Shop Workers

Detroit

• • • UAW-CIO has formed a forging council which will serve as a bargaining representative for forge shop workers. According to a UAW-CIO spokesman, the union has been in contact with local unions in the forging industry for some time, exploring the possibilities of forming a council which will provide a clearing house of information on forge shop rates and working conditions.

According to a statement by Walter P. Reuther, UAW-CIO president, the purpose of the forging council is to "bring to bear on employers in contract negotiations the full economic strength of workers in the forging industry in order to improve wages and working conditions."

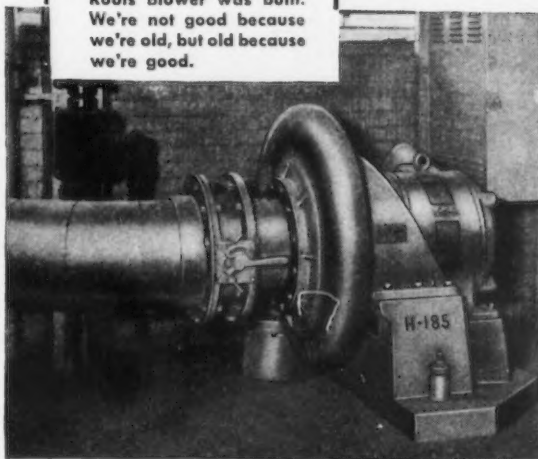
No assignment of responsibility for the union organization drive on the forging industry has yet been made. Informed sources believe, however, that a Detroit member



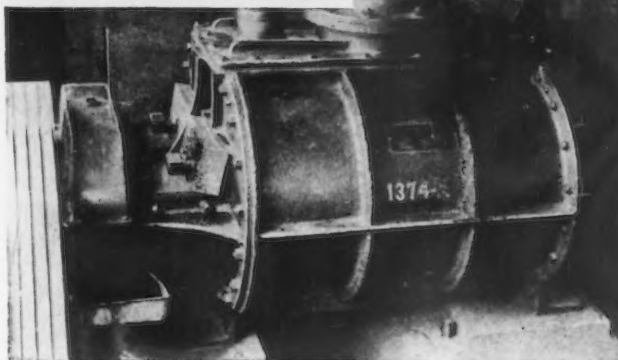
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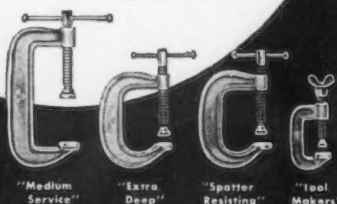
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NEWS OF INDUSTRY

of the executive board will be given this assignment.

Chevrolet Forge & Axle and other Detroit representatives of the forging industry appear to be immediate objectives of the union organization plan. It is not believed, however, that the forging council will attempt to represent individual forging plants in 1948 wage negotiations. Most sources interpreted the UAW-CIO announcement as another move on the part of the union to establish master wage agreements in sections of the metalworking industry as a step toward achievement of an industry-wide wage agreement.

Japanese Aluminum Report

Washington

• • • Cheap electric power and availability of shipping space enabled Japan to raise aluminum production to a record 150,000 tons in 1943, the Interior Dept. reported last week.

The department said in a new report, "Aluminum Metallurgy in the Japanese Empire," that Japanese engineers borrowed from the experience of the United States, Germany, Norway and Sweden in developing Nippon's aluminum industry to fourth position among world producers.

Production difficulties began to crop up when the war blockade forced Japan to turn from bauxite to aluminous shale from Manchuria and alunite from Korea, and finally to domestic clays.

Reports on 13 aluminum-producing plants are included in the volume which is available at the Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pa.

Trade Agreement Signed

London

• • • Prices of Belgian steel delivered in Turkey and other Middle East countries are still higher than U. S. prices, despite the effects of the recent Belgo-Turkish trade agreement.

The new agreement calls for payment in dollars for Belgian goods, and will send iron and steel products to Turkey. Belgian 26 gage galvanized sheets have been selling at \$370 c.i.f. Istanbul.

Spring

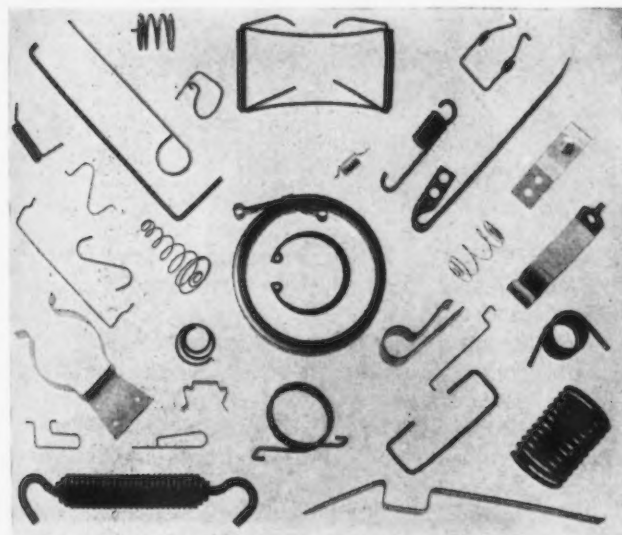
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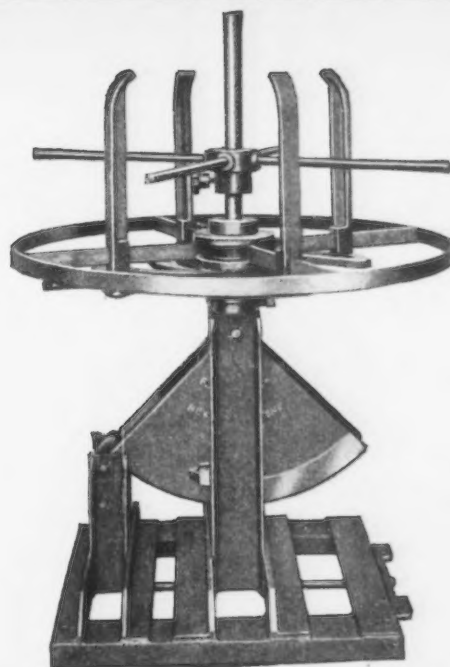


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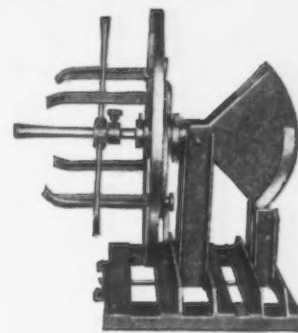
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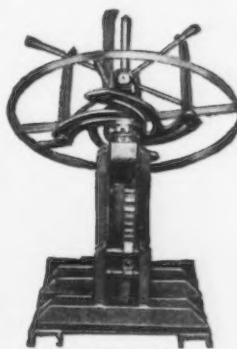


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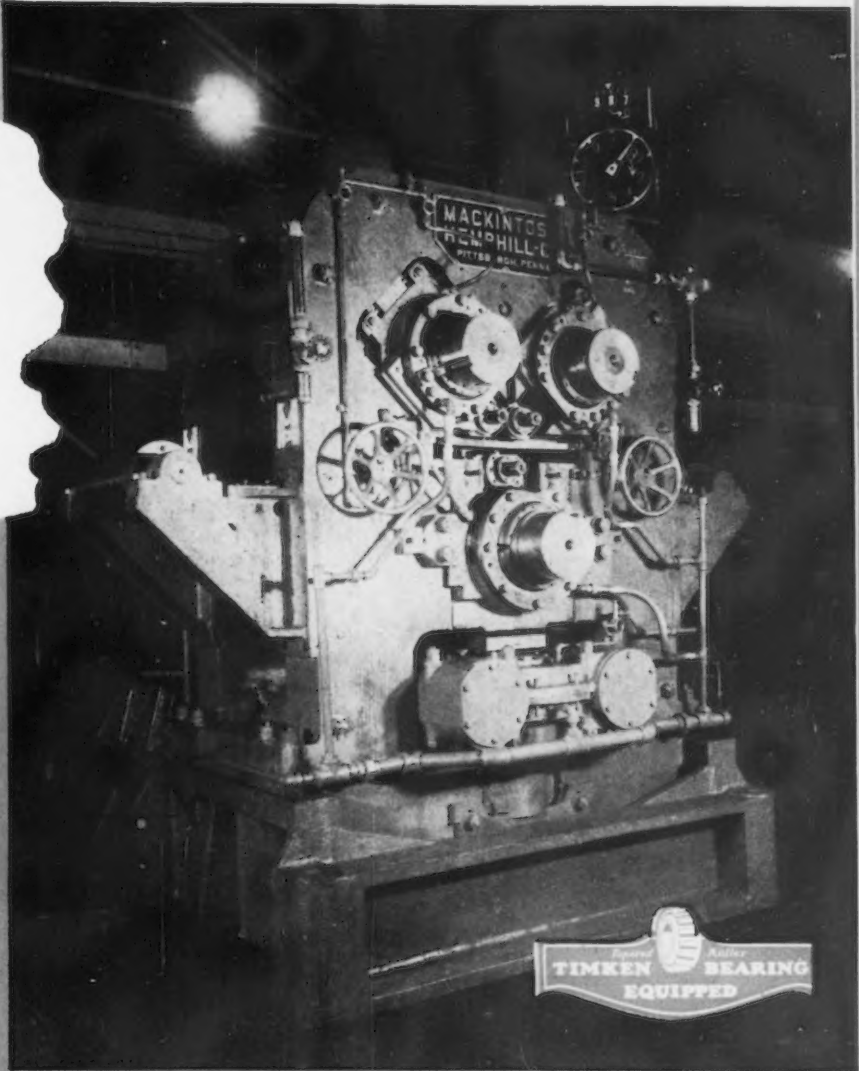
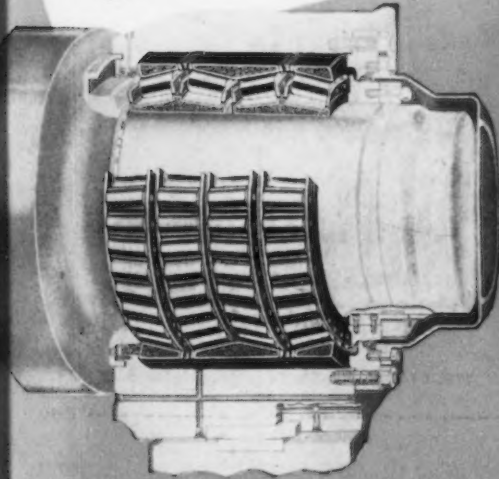
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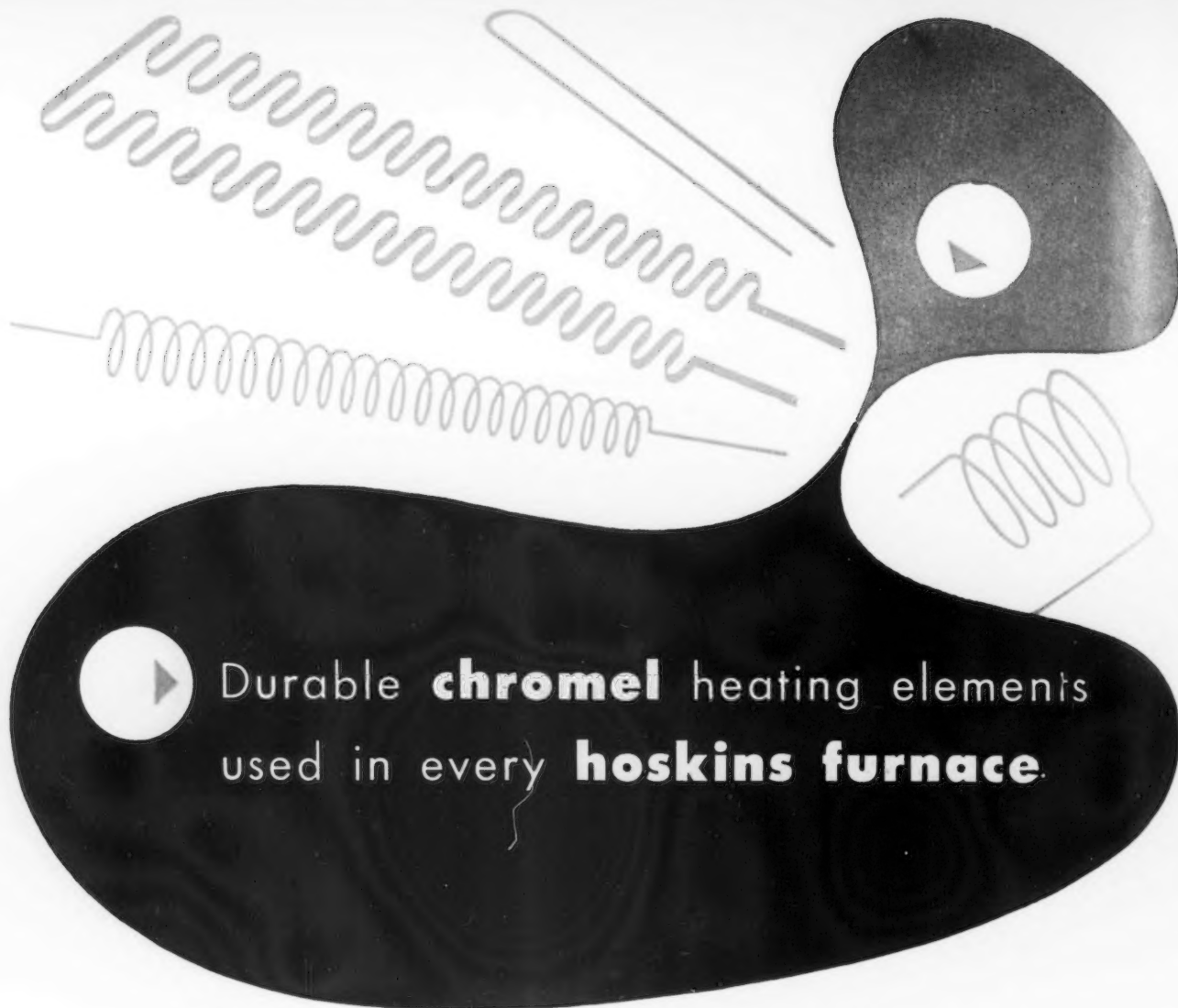
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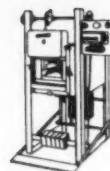
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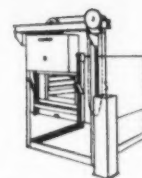


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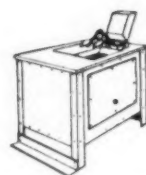
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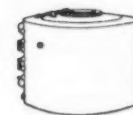
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BOX FURNACE



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